

Playing It Close to the Vest

By Marcia Blumenthal
CW Staff

DETROIT — Burroughs Corp., a company with a reputation for keeping to its own knitting, has produced a fabric distinguished by tight financial controls, solid technology and a loyal user base.

In weaving a corporate identity often described as austere, Burroughs — unlike its competitors — has stitched up crises while sustaining smooth revenue and profit growth.

Ray W. Macdonald, Burroughs' ex-chairman who retired at the end of 1977, was the driving force that guided Burroughs

through its major corporate traumas — switching from mechanically to electronically oriented products and revamping cor-

Burroughs

This is the third in a series of profiles of IBM competitors in the general-purpose mainframe area.

porate marketing strategies.

Macdonald's widely known "growth theory" insisted upon maximum long-term

growth of 15% annually or a doubling every five years. To do this while maintaining technological leadership, Macdonald formed in 1964 a Profit Improvement Committee intent on reducing sales support and field engineering budgets, cutting certain salaries and making plant managers reduce costs by at least 5% annually. Macdonald thought these costs could be decreased considerably while keeping research and development spending at significant levels.

Macdonald refused to hew to what was then a commonly held view — that computer companies had to suffer years of un-

(Continued on Page 4)

COMPUTERWORLD

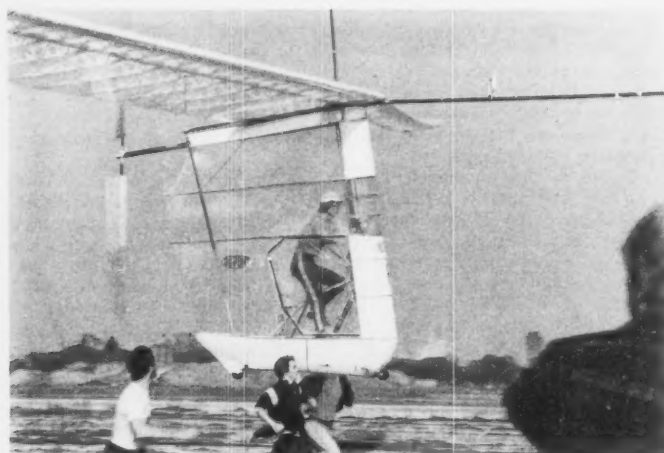
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If Leonardo Had DP . . .

The idea was simplicity itself — aircraft powered by human energy — but it took DP power to make it a reality. The Gossamer Albatross, which last week crossed the English Channel, was designed with the help of computer programs. Story on Page 7.

FAA's DP Resources Under Probe

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — Questions about the adequacy of the Federal Aviation Administration's (FAA) data processing resources have arisen in the current investigation into the airworthiness of the McDonnell Douglas DC10 aircraft.

Information on possible DC10 manufacturing problems may have been available from FAA computers before the agency decided to indefinitely ground the aircraft, according to a congressional subcommittee. The FAA, however, denied this.

Following the May 25 crash of an American Airlines DC10 in Chicago that killed 275 people, the FAA ordered all DC10s in domestic use to be grounded and checked for possible problems with engine mounts. After numerous faults were found in the planes' engine support structures, the FAA revoked its certification of the

aircraft for use in the U.S.

The certification was revoked June 6, but Rep. John L. Burton (D-Calif.), chairman of the House Government Activities and Transportation Subcommittee, said the FAA received as early as July 1 information of possible

design and manufacturing problems with the jumbo jet.

During a heated exchange with FAA administrator Langhorne M. Bond in subcommittee hearings last Monday, Burton demanded to know why the

(Continued on Page 6)

Users Found Unmoved By Lure of IBM 8100

By Marcy Rosenberg

CW Staff

SAN JOSE, Calif. — IBM's long-awaited 8100 system, touted as the golden staff to shepherd its users into distributed data processing (DDP), has yet to amass a large flock.

Many of those users who did follow the leader placed orders to gain favorable delivery positions and are now searching for greener pastures, according to a report by Strategic Business Services here.

To glean user reactions to the 8100 system, based on 64K-bit chip memory technology, Strategic Business Services Vice-President Lawrence D. Dietz interviewed 27 8100 customers and five users who did not choose the system. The 27 customers accounted for 278 systems, and orders ranged

from one to 63, with 10 as the average.

Although the 8100 was initially heralded as IBM's stamp of approval for the black art of DDP, sales have not reached runaway proportions, Dietz found. In fact, research by industry consultant and report reviewer Dr. David E. Gold indicated the 8100 represents less than 25% of the total DDP market.

With the help of user responses, Dietz predicted what the impact of other and newer IBM systems, announced and unannounced, would be on orders for the 8100. According to his report:

- A number of users planned to move to the System/34, despite what Dietz cited as that product's RPG-II language limitations and the lack of a defined upgrade path.

- The anticipated H series, depending on its capabilities and delivery schedule, will probably cause more defections from the 8100.

- IBM's 4300 will sap a large portion of the potential 8100 customer base.

Most IBM Data Processing Division (DPD) customers appeared to gravitate toward the 4300 rather than the 8100 because the former is a host class

(Continued on Page 8)

More System Outages Hit O'Hare

By Marguerite Zientara

CW Staff

CHICAGO — Outages experienced by air traffic control computers at both O'Hare International Airport and the nearby Air Route Traffic Control Center (ARTCC) in Aurora last week caused minimal air traffic delays — but a "potentially extremely dangerous situation" for passengers, according to air traffic controllers.

The outages are the latest in a series at O'Hare and Aurora that on occasion

have resulted in snarled air traffic throughout the Midwest [CW, March 20, Nov. 6, 1978; March 26, April 23, 1979].

On Sunday, June 10, O'Hare's Univac 8303 system was down for 24 hours; two faulty circuit boards were to blame, according to a spokesman for O'Hare's Airways Facilities Sector. It took a long time to pinpoint the problem because of the complexity of the machine, he added.

The long outage at O'Hare "did not

really" cause any problems for the air traffic controllers, partly because Sunday air traffic is lighter than weekly traffic, according to Warren Webber, O'Hare's data systems officer. But controllers at nearby Aurora were wrestling with on-again, off-again alphanumeric data on their radar screens.

Computers furnish air traffic controllers with such data as an airplane's airline name and number, ground speed

(Continued on Page 2)



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Coast Sites Asked to Cut Power

By Brad Schultz
CW Staff

SAN FRANCISCO — DP users in northern and central California went on a Stage I alert with other Pacific Gas & Electric Co. (PGE) customers last week as hot weather sent the demand for electricity soaring.

Utility customers, including nearly all DPers in the computing-intensive

"Silicon Valley" area, were asked to set air conditioner thermostats at 80°F in "occupied" areas and 85°F in "unoccupied" areas and to defer use of appliances between noon and 6 p.m.

PGE is now close to rationing the electricity it sends to customers, which include most DP users in central California — about 100 miles north of Los Angeles. Brownouts and other "poor

power" conditions imposed in rationing are known to cause computer hardware failures.

The power crunch was aggravated by state employee work stoppages last Wednesday at PGE's San Luis and Hyatt-Thermolito generating plants, which reportedly caused the loss of 722,000 kilowatts of capacity. Another plant, capable of 750,000 kilowatts, was down for repairs.

As a result, PGE's generating reserves sank below 5% of demand, prompting the Stage I "planned control" alert.

Though some PGE plants, closed for repairs, are expected to resume service before long, the utility's nuclear power plant in Rancho Seco, near Sacramento, remains idle by order of the Nuclear Regulatory Commission (NRC) because of its design similarity to the Three Mile Island facility, whose core nearly melted down last March.

However, the NRC will probably lift its Rancho Seco injunction in about two weeks, the PGE source indicated.

The utility will cut power to low-priority customers in a Stage II alert if reserves fall under 3%, the spokesman stated. The cutoff would probably affect some DP users. Stage III — rotating blackouts — would be imposed if reserves fall under 1.5%, he said.

More Outages Hit O'Hare

(Continued from Page 1)

and altitude. "When the computer fails, a controller can still get the information he needs from other sources like radio communications," according to Matthew Dunne, an O'Hare controller and president of the O'Hare chapter of the Professional Air Traffic Controllers Organization (Patco).

"The danger lies in the transition period going from visible alphanumeric data to a mental, three-dimensional picture of all the airplanes being controlled," he noted. The possibility of a mid-air collision reportedly increases in the first few minutes after the computer fails, when the controller could become disoriented and lose track of his airplanes.

At Aurora, controllers were faced with a four-hour outage of their IBM 9020E on Saturday, June 9, and an early-morning, two-hour outage on Sunday followed by a five-hour outage that started less than two hours later, according to Wayne Preston, Patco president at Aurora.

Monday brought the worst computer-oriented conditions for the Aurora controllers, with one outage that lasted from 10:53 to 11:07 a.m. and another from 12:45 to 12:50 p.m., Preston said. Monday's outages were "short but dangerous . . . The longer the computers are down the better it is," he explained, because controllers became acclimated to the change in minutes. Continual flip-flops cause the strain of readjustment.

The computer problems at Aurora were traced to the malfunction of a cable that was then taken to New Jersey

for further testing.

In addition to the outages Aurora's system lost its programmed forewarning of a possible imminent loss of alphanumeric data on Sunday, Preston noted. "Knowing that [an outage] does happen and can happen and not knowing if and when it might happen adds to the stress," he said.

While controllers at O'Hare filed a suit against the Federal Aviation Administration (FAA) in 1975 asking for a backup computer system, among other demands, it has now been a year and a half since the trial, and the judge has not yet made a decision.

An enhancement package consisting of two Univac Input/Output Processors, due to be installed at O'Hare last August, is now slated for installation this September. "They're having hardware problems that are being worked out now," Webber explained.

Besides the lack of computer backup systems, air traffic controllers at O'Hare have other complaints. "The FAA has said that since we have this great, almighty computer, we are able to work 25% more airplanes," Dunne noted.

"But when the computer goes down," he said, "they ask us to control the same number of airplanes with the same number of people on duty."

Because of computer memory overloading, the clock sometimes skips seconds and altitudes are not displayed. "Because these functions are on a time-sharing basis with all the other functions, the most important jobs come first, and the other ones don't get done," he said.

Better Late . . .

The grounding of all DC10 aircraft has not only taken its toll on passenger air traffic, but also on the Computerworld delivery schedule.

In order to get Computerworld to you Monday morning, we airlift the bulk of our copies from our printing plant in Chicago to various post offices around the country. However, with the DC10s grounded — and the rest of the airlines swamped with passenger traffic — this has become increasingly difficult to accomplish.

We apologize for any delays caused by this situation. We are working to find alternative routes of delivery.

This Week

IN DEPTH

Facing Up to Conversion — Part 3 49

NEWS

Burroughs Exploring 18 New Areas of Business . . . 5
White House Ecom Study Spurs Senators' Lobby . . . 6
System Helps Design 'Gossamer Albatross' 7
California DP Crime Bill on Way to Enactment 8
Prosecutors of DP Crime Held at Disadvantage 9
Computers Play Varied Movie Roles 10
Superman's CRT Just One Show Highlight 11
People Relationships Seen Key to Manager's Job . . . 12
Top-Level Execs Seen Reluctant to Automate 13
Third World's DP Infancy Attributed to Isolation . . . 14
DP Wins Important Place on U.S. Olympic Team . . . 15
Women Seen Suffering 'Subtle' Discrimination . . . 16
Ways Noted for DPers to Open Verbal Closets . . . 17
AT&T Subsidiary for Hybrid Services Predicted . . . 18
Lack of Training for System End Users Scored . . . 19

EDITORIAL

Editorial: What Do You Want at NCC? 24
Human Connection: Attitudes Key to Productivity . . 25
Taylor Report: Town Becomes Computing Capital . . 25
Quality Control Analyst: Next Development in DP? . 25

SOFTWARE & SERVICES

Settlement Confirms Users' Rights 31
Studies Give Modern Techniques Mixed Ratings . . 32

COMMUNICATIONS

SNA Upgraded to Handle More Links 39
Railway Plans Sophisticated Monitoring 41

SYSTEMS & PERIPHERALS

Switch to Page Printers Pleases Users 43
Printer for Retailers Produces 174 Label/Sec 45

MINIWORLD

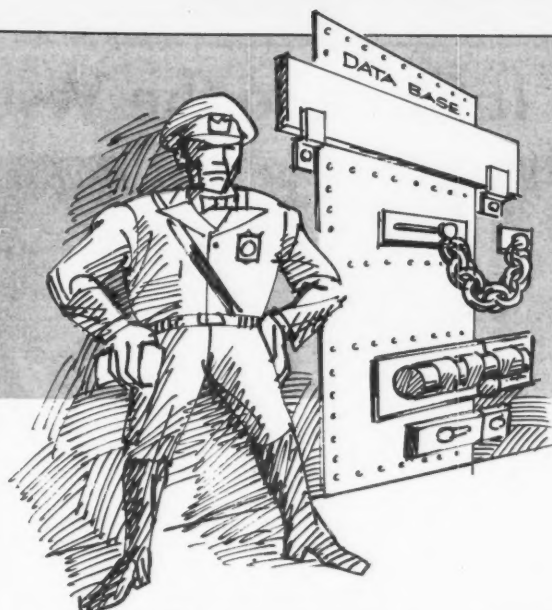
Turnkey Success Not Automatic: Panel 57
PDP-11/70's I/O Performance Improved 58

MICROCOMPUTING

Micro-Based Aids for Disabled Shown 61
Seven Courses on Micros Ready 62

COMPUTER INDUSTRY

STC, Intel Show Semiconductor Disks 63
Component Makers Neglecting Customization . . . 63
Software Lacks Universal Means of Protection . . . 65



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Mainframer Prefers to Play It Close to the Vest

(Continued from Page 1)

profitable investment before turning profitable.

In addition, he realized as early as 1965 that to serve specific industries, Burroughs would have to develop a full power range of computer systems. While most of Burroughs' competitors today have complete lines, they were not as quick as Burroughs to get them in place.

In instituting the change from accounting machinery to electronics equipment, Macdonald did not abandon the original sector of Burroughs' business. Rather, the profits derived from the company's mainstay — accounting machine products — were poured into R&D for computer systems.

The financial orientation adopted by Macdonald is still very much in evidence today at Burroughs. Paul S. Mirabito, chairman, president and chief executive officer, takes pride in pointing out that Burroughs has increased its pretax profit margin from 6% to 20% during the past 15 years.

'Chintzy' Operation?

Yet some analysts think Burroughs has sheared its costs to the limit. "Burroughs is operating at profitability levels it achieved through heavy cost control," according to Thomas Crotty, vice-president of the Gartner Group, Inc. Crotty thinks Burroughs is at the peak of its profitability and predicted industry trends will force the company's margins down.

Burroughs has been "chintzy" with marketing support, Crotty said. Its salesforce almost unionized at one time because of low compensation, and where compensation is low, there is a tendency for raiding, he observed.

Bristling under such criticism, Mirabito countered, "We manage a job tightly. If a job needs five people, that's all it's going to get."

The feisty chief is incensed at some analysts' perception of the company as stodgy. "Yes, we are conservative from a financial point of view, but we think we are the most innovative of any [of the computer] companies. We are viewed as conservative because we are predictable."

Admirable Financial Picture

Despite criticism of its frugality, Burroughs' financial performance has been consistently admirable.

Reporting revenues of \$2.1 billion for its latest fiscal year, Burroughs over the past five years has increased its revenues an average 14% annually with average annual earnings growth a solid 18.8%, according to *Computerworld* analyses.

While in the past two years its growth rates have been more sluggish than those of Control Data Corp. and NCR Corp., Burroughs' growth has been steady.

The fruits of cost-cutting measures are reflected in Burroughs' after-tax profit margin which, for the past five years, has been 9% to 10% of revenues, the highest of any of the non-IBM mainframers. Moreover, when compared with its non-IBM competitors, Burroughs has:

- The lowest debt-to-equity ratio, hovering in the 10% to 15% range.
- More sales per asset dollar expended.



CW Photos by M. Blumenthal



Some of Burroughs' top brass (from left): Paul S. Mirabito, chairman, president and chief executive officer; DuRay E. Stromback, executive vice-president, planning; J. Roy Henry, executive vice-president, marketing; Lloyd W. Cali, executive vice-president, engineering and manufacturing; and James A. McCullough, vice-chairman of the board.

- The highest price earnings ratio.

Two Weaknesses Cited

Whether Burroughs can sustain its financial leadership remains to be seen. Analyst Crotty faulted the manufacturer for being weaker than most mainframers in the rapidly expanding international marketplace and for having a thin layer of "inbred" top management.

With roughly 38% of its general-purpose mainframes installed interna-

'Yes, we are conservative from a financial point of view, but we think we are the most innovative of any [of the computer] companies. We are viewed as conservative because we are predictable.'

tionally, Burroughs ranks the lowest of any of its mainframe competitors in foreign installed base, according to International Data Corp. (IDC) statistics. NCR Corp. has the next lowest number of foreign installations, with 44% of its mainframes shipped abroad.

While disdaining the nationalistic protection in France and the UK, Mirabito is quick to point out that Burroughs holds 6% to 8% of the lucrative Japanese market. The company owns 95% of Takachiho Burroughs Co., Ltd.

Although Burroughs has lost two top executives — Charles E. Exley Jr. and Manuel Garcia — to NCR in the past three years, Mirabito is confident the company will be able to meet its management requirements. "Today we have 10 group executives, young men in their 40s, who have 20 to 25 years with Burroughs." And Mirabito, who will be 65 next year, has no intention of retiring.

Strong on Software

Although Burroughs runs a tightly controlled financial ship, it has never neglected technology, which industry observers consider solid and highly innovative. Burroughs was one of the first companies to incorporate virtual memory and multiprocessing capability into its systems.

"We never asked engineers to follow the architecture that was being

adhered to by other companies as long as the research was cost-effective or resulted in improved product price/performance," Mirabito noted.

Since 1964, the company has been designing systems with the attitude that software is an integral part of the engineering job. Burroughs has been especially strong in operating software development, using high-level languages such as Algol in its early operating systems.

In developing the B5000 computer system 20 years ago, Robert S. Barton, a 20-year Burroughs veteran who recently received the first Eckert-Mauchly Computer Architecture Award, incorporated a Master Control Program (MCP) feature into the operating system. This feature, considered to be the first of its kind embedded in a commercial system, automatically performed hundreds of system management functions that otherwise would have required programming by users.

The early software emphasis has carried over to Burroughs' current product line. Its medium-scale systems are totally operating system and application compatible with each other, J. Roy Henry, executive vice-president of marketing, noted. This compatibility spans the range between the B1800 and B4800 as well as allowing upgrades from the 500 and 700 series.

Burroughs currently spends about 50% of its \$170 million R&D budget on software development. The company has a separate Program Products Division with 10 development centers worldwide, DuRay E. Stromback executive vice-president of planning, said.

While the "not-invented-here" syndrome is often open to criticism, Burroughs executives think this has been one strategy that has paid off handsomely in market results.

No. 3 From Top

At the end of 1978, Burroughs ranked third among the non-IBM mainframers with 6,838 general-purpose systems installed worldwide, according to IDC. It holds 5.6% of the dollar value of installed general purpose systems.

Of these units, Burroughs' dominant share is the mid-range systems. Its market share here is an estimated 19.6% domestically and 11.6% share

internationally in terms of units installed, IDC found.

These products — the B2500s through the B6800s — roughly approximate IBM's 370/125 to 370/148 power range.

With 6,230 small business units installed worldwide, Burroughs holds 12.7% of that market, second only to IBM's 30.2% share, IDC estimated.

However, Mirabito recently claimed that Burroughs has about 25,000 computers installed or on order, a sharp departure from IDC's round figure estimate of 13,000 units.

While Burroughs, according to IDC, comes in third after Univac and Honeywell, Inc. in terms of the value of its installed base, its entire base has been accumulated by internal sales rather than by acquisition. Univac acquired RCA Corp.'s user base and Honeywell purchased General Electric Co.'s and Xerox Corp.'s user bases.

Burroughs has one of the industry's broadest product lines. The firm recently created a stir among industry waters when it brought out the Burroughs Scientific Processor (BSP), which is not in keeping with the firm's traditional business product line. But company executives, who liken the BSP to a Cray-1, aren't banking on significant revenues from this product.

Burroughs is a major factor in the terminals market, particularly the single-station processing terminal market in the U.S. and Europe. It holds the major share of the U.S. bank teller terminal market, according to IDC.

The company also makes a slew of other products, including document readers and sorters.

Loyal But Demanding

Users seem to have few beefs with Burroughs products. Even the once-criticized field service support has improved.

"The waters have quieted in the past five or six years," Milton Fredlund, president of Cube, Inc., the company's user group, said. "User meetings are more like love-ins lately," Judd Peter, Cube's treasurer, added.

In particular, Peter pointed to the company's reliability, availability and maintainability (RAM) program, started three years ago. Under this program, Burroughs pledged to build

(Continued on Page 5)

Already Into 'Office of Future'

Burroughs Exploring 18 New Areas of Business

By Marcia Blumenthal

CW Staff

DETROIT — Although Burroughs Corp. will continue to "farm where it has been farming," the firm is currently exploring 18 new areas of business, according to DuRay E. Stromback, executive vice-president of planning.

Burroughs has already made a strong

Firm Known For 'Frugality'

(Continued from Page 4)

more internal diagnostics into its systems and give better training and an information network to its field service engineers.

The program's critical feature is the requirement that equipment receive a final sign-off from the corporation's maintenance arm before it is manufactured.

"We'll find out whether the program is worth anything when the 900 series [machines] are out in the field long enough," Peter said. As part of that series, Burroughs recently introduced its 2930 and 3950 processors in response to IBM's 4300 line [CW, March 5].

Typical users tend to be demanding and critical: "Anybody who goes to the trouble of selling its company on Burroughs is a demanding individual."

User loyalty is a great source of pride to Burroughs — some 60% of the company's revenue is derived from its current users. In addition, a portion of the remaining 40% of the revenue from new business includes new applications sold to existing accounts.

In marketing its products, Burroughs, like other mainframers, has been limited by its ability to hire salespeople. The firm is adding 2,000 marketing personnel yearly, Henry said, adding that recruiting is done primarily at schools rather than by raiding other company's sales forces.

Henry noted that it is expensive to recruit experienced sales help because the 35 to 50 new computer-related companies starting up each year are luring experienced salespeople with high salaries and premiums. Burroughs' emphasis on cost control appears to explain some of the company's reluctance to raid.

This year, Burroughs will provide 130,000 man-weeks of training at its 50 training centers for both sales personnel and customers. The firm added 12 training centers last year.

Like other mainframers, Burroughs is segmenting its marketing effort by industry. Today 35% of its revenue is derived from the banking industry. Other industry targets include manufacturing; state, local and federal government; distribution; and medicine.

Henry noted that Burroughs is seeing a 25% to 30% overall growth rate in its high- and small-end systems. "That type of growth is difficult to sustain in our medium-range products because our installed base is so inundated," he said.

One strategy Burroughs has adopted is developing applications IBM has ignored. For instance, its advanced data management system is one area Burroughs thinks IBM has neglected.

foray into the "office of the future" market, buying Graphic Sciences, Inc., a supplier of facsimile transmission equipment, in 1975. A year later the firm acquired Redactron Corp., a maker of word processing equipment, and this past April it purchased Context Corp., an optical character recognition equipment vendor.

At the beginning of the year, Burroughs formed a separate Office Automation Division to incorporate the product lines of the three acquired companies.

Office Automation and DP are merging into "information processing," but vendors must stay out of the customer's internal politics during the

merger of these two disciplines, Stromback warned.

While Burroughs is concentrating its long-range planning on data transmission and office automation, executives agreed data base is the arena in which the future battle among mainframers will be fought.

Burroughs is currently trying to solve the problem of tying together distributed data bases. Although he would not disclose when a solution would be available, Stromback did say that "it's not very far away."

Recognizing the opportunity in the OEM marketplace, Burroughs formed an OEM Peripherals Group for disk devices and printers at the beginning

of this year. Burroughs already makes all of its disk equipment and half its printers, Stromback noted.

The company has also been toying with the idea of selling some of its small systems on an OEM basis, but has not made a commitment to this venture.

Another opportunity for further verticality is the manufacture of integrated circuits; in the future, Burroughs plans to produce a significant portion of its components requirements.

With 18 lines of business under consideration, Burroughs is avoiding entry into the satellite communications market. "It's too regulated," Stromback said.

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Carter Urged to Reject Service Study of Ecom Spurs Lobby Opposing It

By Jake Kirchner

CW Washington Bureau

WASHINGTON, D.C. — A just completed White House study of U.S. Postal Service involvement in electronic mail has prompted a last-minute lobbying effort by a bipartisan group of U.S. senators and diverse telecommunications industry representatives.

"The Postal Service should not develop or procure its own electronic message system or directly market services which involve telecommunications," four members of the Senate Commerce, Science and Transportation Committee said in a May 25 letter to the President.

The Postal Service has proposed a pilot Electronic Computer-Originated Mail (Ecom) service. Implementation of the 25-city joint venture of the Postal Service and Western Union Telegraph Co. is awaiting the outcome of the Administration's study.

A second letter to the White House from 10 industry representatives urged President Carter "to reject this ill-advised Postal Service effort to enter the telecommunications business."

The final report of the White House study, prepared by the National Telecommunications and Information Administration, was scheduled to be delivered to the President by the end of last week, according to Robert Malson, assistant director of the White House Domestic Policy Staff.

"The comments of [the senators] are being taken into account along with other congressional views and private sector views," Malson said. Evaluation of these views is "part of the process," he added.

'Expensive and Duplicative'

The Senate letter was signed by Committee Chairman Howard Cannon (D-Nev.), Communications Subcommittee

Chairman Ernest F. Hollings (D-S.C.), the committee's ranking minority member, Barry Goldwater (R-Ariz.) and committee member Harrison Schmidt (R-N.M.).

Noting that the Postal Service intends to spend \$1.7 billion to develop electronic message services (EMS), the senators said, "Our hearings indicate that such ventures are unnecessary, expensive and duplicative of the private sector . . . Direct involvement by the Postal Service in telecommunications is a substantial departure from long-standing national communications policy which, since the 19th century, has relied exclusively on the private sector for the provision of electronic communications."

The senators see "convincing evidence that the public's need for diverse

telecommunications services, including 'electronic mail,' is being met by the private sector. The inclusion in this industry of a quasi-governmental entity with a large base of monopoly revenues, a tax-exempt status and the full faith and credit of the United States will have a chilling effect on competition."

"Postal Service involvement will most severely impact smaller firms in this industry, which have an excellent record of innovation in product and service offerings." The letter called for the Administration to foster a competitive EMS industry.

"We believe that a largely deregulated industry environment can be created and will most appropriately serve the rapidly increasing demand for telecommunications services of all types."

FAA's DP Resources Probed

(Continued from Page 1)

agency was unaware of these reports, allegedly stored in FAA computers. According to a subcommittee aide, the panel is investigating whether that information was indeed readily available from the FAA's Oklahoma City DP center and if not, why not.

Theoretically, the FAA system should be able to alert the agency to maintenance or design problems discovered during periodic checkups, the aide explained. A "service difficulty report" must be filed on any problem found by airline mechanics.

The service schedule for individual aircraft can then be set up by scanning the data base and checking the history of the plane or individual parts of a particular type of aircraft. The aide noted, however, that in practice there does not seem to be any centralized data base for this procedure.

"Subsequent to the first [DC-10] grounding, inspection reports that were filed by some of the airlines indi-

cated . . . some of the [engine support] assembly problems that they discovered might be factory-based . . . That should have at least raised the issue of whether there were manufacturing problems and design problems," the aide said.

Burton is said to be particularly concerned about the adequacy of the FAA DP resources because the agency, with its limited number of inspectors, must rely very heavily on the system. The subcommittee will be looking into how often the data base is updated and whether the system is programmed to adequately "flag" possible problems.

The system should not be "sitting there humming away waiting to have someone ask it the right questions," the subcommittee aide said. The early inspection reports, particularly those of Northwest Airlines and American Airlines, should have alerted the agency to possible manufacturing problems almost a week before the DC10 certification was revoked, he contended.

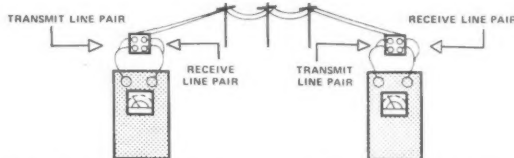
William Thievon, chief of the FAA Safety Data Branch, told *Computerworld* the FAA system does flag problems "in the critical areas" — problems that would affect airworthiness. In the case of the DC10, he said inspection records are being handled manually and the five-day delay of which Burton complained was caused by communication problems between FAA's western branch office, which is handling the crash investigation, and its Washington headquarters.

The Oklahoma City center updates the maintenance data base every two weeks. The system is therefore too slow to be used during crash investigations, according to Thievon, who explained the communications problem as the result of a large bureaucracy. He conceded that it is embarrassing for Burton to have received certain documents before Bond had seen them.

Beyond the immediate issue of what caused the Chicago tragedy and what flaws in FAA procedures were demonstrated by its handling of the subsequent investigation, the Burton subcommittee feels the most sophisticated technology should be used to assure the safety of air travelers. The panel will look into the possible necessity of upgrading FAA DP systems.

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System Propels Design of 'Gossamer Albatross'

By Tim Scannell
And Jay Woodruff
CW Staff

CAPE GRIS-NEZ, France — A plane with a wingspan greater than that of a McDonnell Douglas DC9 passenger jet but weighing half as much as its pilot made the first human-powered flight across the English Channel early this week.

Complex computer programs were used to design the lightweight, high-strength parts in the Gossamer Albatross and allowed the American team that entered the Albatross to win almost \$200,000 in prize money in the Kremer Cross Channel Competition.

Posted by British industrialist Henry Kremer nearly 20 years ago, the prize was finally captured last week by Dr. Paul MacCready, a California physicist, aeronautical expert and three-time National Soaring Champion, and pilot

tired Allen and his craft to within a foot of the ocean's surface; at another, Allen had to make a course correction to avoid a supertanker passing through the area.

Brains Behind the Project

Dr. Peter Lissaman is a self-described "theoretical aerodynamicist" and vice-president of aerosciences at Aerovironment, Inc., the company started by team leader MacCready for exotic research projects like ocean-driven turbines and planes destined for flight on Mars.

Lissaman did the computer work on the aircraft, including work on the airfoils for the wings and on the propeller, and determined how to achieve material strength in so light and so



Paul MacCready

large a plane.
Basic compilations were performed

on a Hewlett-Packard Co. 9820 programmable desktop computer. To avoid the huge equations often used to represent flight conditions, the aerosciences department worked with "the real physical equation," according to John Blair, the DP manager at Aerovironment.

An "elegant type of program" based on a design method used 20 years earlier was fed into the computer. "Lissaman went back to the basic physics of the whole problem, [developing] straight-forward, simple representations," Blair said.

Lissaman, who started designing airfoils 20 years ago, put the program together in his spare time in three months. "My main problem was writ-

(Continued on Page 8)



Bryan Allen

Bryan Allen, a 26-year-old cycling champion and hang-gliding enthusiast.

A team of pilots, a support group and an additional pair of planes were kept at the ready to ensure the success of the effort. The crew had to wait in England for a month before weather conditions were calm enough to make the two-hour, 49-minute flight.

Generation of Winners

The same team had passed a milestone in man-powered flight two years before when an earlier plane, the Gossamer Condor, successfully negotiated a 1.15-mile figure-eight course at an airport near Bakersfield, Calif. Kremer posted the \$100,000 in prize money for that competition as well.

Both planes were designed with the aid of computers, but the 70-pound Albatross, which traveled the 25 miles from Folkestone, England, to the beaches of Cape Gris-Nez, had a more sophisticated wing design and lighter materials.

However, a combination of additional safety materials and five pounds of early-morning dew on the Albatross's clear plastic skin brought the plane's weight to 75 pounds, only a few pounds less than the weight of the Condor, according to a spokesman from Du Pont Co., the company that underwrote the project for \$200,000 and supplied most of the plane's lightweight parts.

The added weight required Allen to pump away on the bicycle-like device for nearly three hours, generating one-third horsepower, a force somewhat greater than the one-quarter horsepower needed to propel the Albatross under optimal conditions.

The trip was not uneventful. At one point, the plane ran into an unexpected head wind that dropped the

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California DP Crime Bill on Way to Enactment

By Jeffery Beeler

CW West Coast Bureau

SACRAMENTO, Calif. — California's computer crime bill continued its slow but steady progress through the state legislature here when the full Senate recently approved the proposed law by a 33-0 margin.

The June 7 vote marked the third legislative hurdle that S.B. 66 has overcome en route to possible enactment.

On May 1, the eight-member Senate Judiciary Committee unanimously adopted S.B. 66 after its sponsors made legislative revisions aimed at clarifying the bill's intent and phrasing [CW, May 14]. Then, on June 4, the Senate Finance Committee informally endorsed the legislation by forwarding it, without a vote, directly from the Judiciary Committee to the full Senate floor.

Having passed the Senate, S.B. 66 now goes to the state Assembly, where it will first undergo review by the Assembly Judiciary Committee and then, possibly, by the Ways and Means Committee.

No date has been chosen yet for the Judiciary Committee hearing, although a source expects the session to take place sometime in July.

Bill Resembles S.240

Introduced Dec. 5 by state Sen. Lou Cusanovich (R-Woodland Hills), the bill closely resembles S. 240, the federal computer crime legislation cosponsored by Sen. Abraham Ribicoff (D-Conn.) and currently undergoing debate in the U.S. Senate.

If enacted — and its prospects for

passage are steadily improving — S.B. 66 would outlaw the use of computer equipment for fraud or extortion and would forbid the "malicious" access or alteration of computer hardware, software or data.

Individuals convicted under the law would be guilty of a felony and could receive a 16-month to three-year prison sentence, a \$2,500 to \$5,000 fine or both.

At a Senate Judiciary Committee hearing on Feb. 27, opponents blasted S.B. 66 as dangerously ambiguous in its phrasing. Unless the bill's terminology were defined more clearly, the critics charged, S.B. 66 would make crimes of common industry practices

and would place trivial DP violations in the same criminal category as major offenses like wire fraud.

The proposed legislation would even outlaw the use of corporate mainframes to play ticktacktoe, they added.

Order for Clarification

Members of the Senate Judiciary Committee agreed with the critics' conclusions and ordered Cusanovich's staff to clarify the bill's language.

The critics also described the proposed law as unnecessary on the grounds that computer crimes are already covered under existing criminal statutes.

But by the time S.B. 66 reached the

state Senate floor on June 7, all serious opposition to the bill had apparently ended. Cusanovich presented the legislation before his Senate colleagues and, hearing no objections, requested — and received — a "quorum vote."

Under quorum vote rules, if a bill is uncontested and a majority of the state senators is in attendance, the Senate foregoes a formal ballot and adopts the legislation unanimously.

Earlier, the Senate Finance Committee had invoked a similar rule when it forwarded the bill to the Senate floor. The Finance Committee declined to vote on S.B. 66 after concluding that the legislation would require no additional state appropriations to enforce.

Users Seem Unmoved by Lure of 8100

(Continued on Page 1)

machine and, in terms of software, resembles the widely used 370 mainframe, Dietz pointed out.

Also, because the 4300 requires a DP staff for its operation and support, several users surveyed viewed the system as a way to extend their staffs down to lower levels of the line organization.

By contrast, many users regarded the 8100 as a system that non-DP types, notably former 3790 operators could run, Dietz said.

Therefore, based on his small but "representative" sample, Dietz concluded that the DP manager who wants to put the ultimate user more in touch with his computing power would lean toward the 8100. Those who seek to further develop the centralized, batch-oriented mainframe scheme would probably opt for the 4300.

Trade-offs between the two systems, however, are apparent and especially bothersome for distribution applications. To illustrate this, Dietz used the example of a manufacturing organization that requires every sales division to communicate with each warehouse for ordering purposes.

The manufacturer can either place 8100s in all its warehouses and sales

divisions or install 4300s in the warehouses to interface with terminals in the sales divisions. The 4300 configuration would necessitate keeping some DP professionals on-site to monitor system operations and shift processing to preserve the network if system problems or failures occur.

Not a Panacea

Still, the 8100 falls short of being the panacea for DDP, Dietz found. Users predominantly outside the IBM camp cited as drawbacks its limited data base support capability and delivery bottleneck.

"September was the earliest 8100 delivery date we found, with most schedules stretching out into 1980," he observed.

Another shortcoming noted was the mutual exclusivity of 8100 operating systems. Although the 8100 tempts users with its ability to harness a variety of peripheral terminals, including magnetic stripe units, a single 8100 system cannot handle both data and magnetic stripe input.

IBM's magnetic stripe 3600 series terminals run only under the DPPX operating system, while data entry terminals such as the 3790 run under DPCX, unless the 3790 code is modified, the report explained.

This situation irritated some users who felt IBM was pushing them to buy two classes of systems.

Most respondents agreed, however, that the 8100 would find its most pow-

erful application in data collection and appeal to Fortune 1,000 companies and other IBM 370 customer who want to venture out of the comfortable batch world into an on-line, interactive mode.

Unlike minicomputers, which provide on-line, interactive capability for the small business in a stand-alone environment, the 8100 through its new terminals offers partitioned screen capabilities to ease the transition to interactive processing for central site DPs previously unfamiliar with CRTs as input devices, users said.

DPs interviewed by Strategic Business Services said the split screen could be used to aid unskilled operators by displaying an order heading during all order entry screen loads. Dietz noted, however, that minis in stand-alone situations already routinely handle this type of application for small businesses.

Manufacturing and insurance companies emerged as the most likely markets for the 8100, he added. Strategic Business Services' and Gold's research confirmed that these industries are best suited to accommodate the system's ability to handle a multitude of terminals and their input and contain a substantial installed base of 3790s that are ripe for replacement.

The report costs \$850 and is available from Strategic Business Services at Suite 215, 4320 Stevens Creek Blvd., San Jose, Calif. 95129.

DP Helps Design Aircraft

(Continued on Page 7)

ing the program in such a way that I could get it into the memory system without any overflow," he said.

Lissaman employed three programs. He explained that moving data from one program to another meant he had to "laboriously feed it into another [program]."

The system generated hard copy of the designs which Lissaman preferred because he could "look at them and mark them up."

Lissaman and MacCready also used an HP 21MX minicomputer with 24K bytes of memory and remote job entry terminals connected to Digital Equipment Corp., IBM and Univac mainframes located at the California Technical Institute, where Lissaman once taught aeronautics.

The computers reduced the calcula-

tion time for one design from approximately 48 hours on mechanical calculating devices to six designs an hour.

The final design gave MacCready and his team a vehicle that was "very, very light and very, very big," measuring 96 feet from wingtip to wingtip. "Relatively speaking, in terms of flying vehicles, the Gossamer is more like the dragonfly insect than a bird or an airplane," Lissaman said.

Projects like the Gossamer Albatross are not done for any basic technical reason, but new information does come from them," he added.

"I don't think this could be done by a programmer. It had to be done by a scientist. You have to think about human-powered flight the same way you think about expedition mountaineering — say, climbing Mount Everest," he remarked.

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Prosecutors of DP Crime Held at Disadvantage

By Tim Scannell
CW Staff

DENVER — Of all the attorneys today practicing law in the U.S., fewer than a dozen are qualified to handle computer or white-collar crimes.

In fact, given a choice, most lawyers would much rather and probably more successfully tackle a complicated rape or murder case than one concerning a simple theft of computer data or time, according to H. Jeffrey Bayless, chief deputy district attorney for Denver.

Addressing a roomful of DP auditors at the EDP Auditors Association's seventh International Conference here in the Mile High City, Bayless outlined some of the special problems a prosecutor faces when confronted with a computer crime case. Before proving that a defendant is guilty beyond any reasonable doubt, the attorney must first prove that something — computer data or programs — was actually taken, then convince a computer-ignorant judge and jury that the DP items are missing even though they might still reside in the machine.

Trained to prosecute "knife and gun" types of crime where the evidence usually can be felt and seen, most attorneys don't know how to approach computer crime — basically because there are no precedents of documented histories or previous crimes. A lawyer's main problem in prosecuting a computer criminal is finding out something about it or other related activities, Bayless stated.

Aversion to Publicity

Only about 5% of computer crimes committed in the U.S. are ever reported because banks, insurance companies and other institutions would rather cover their losses than risk publicity, Bayless noted.

Banks have been known to hire DP criminals as consultants after they have been caught with their hands in the mainframe. Once on the payroll in a new and highly paid capacity, the perpetrator can be watched and the bank can learn how to safeguard its systems against future invasions.

This aversion to computer crime publicity leaves the prosecutor with a minimal knowledge of just what a computer does, the deputy district attorney added. As far as the attorney is concerned, the computer takes information in, does something with it and then "spits something out."

Judges and juries present an even more frustrating problem, according to Bayless. Most judges were schooled in law 20 years ago and haven't yet "caught up" with computer and teleprocessing technology.

In addition, a great many judges have ruled that information — including computer data — is not a thing of value, which leaves the prosecuting attorney trying to modify old statutes to apply to present-day computer crimes.

To confuse things even further, about half of all jurors in the U.S. are more than 60 years old and either have absolutely no understanding or are completely afraid of computers. "The jurors think that the computer is magic," Bayless said, leaving the lawyer with the responsibility to understand the computer well enough to explain it to the jury on a "frighteningly basic" level.

Another problem with prosecuting

computer crimes is what Bayless described as the "hero syndrome" — people identifying a DP criminal as a latter-day Robin Hood. The public "is beginning to find out what can be done with a computer," and there are "people out there who would love to steal great quantities of money," Bayless stated, pointing out that, if caught, a computer criminal stands only a 3% chance of going to jail.

Because lawyers are limited to "backward investigations" — piecing together the facts of a computer crime sometimes months after it has occurred, DP auditors can provide a vital link in catching this specialized criminal, Bayless observed. Through audit trails and careful scrutiny of computer procedures, auditors might be able to

catch an illegal DP act at its "most obvious" stage — the input.

Computer operators and programmers potentially represent the greatest

threat to an otherwise secure system because access can be made with the stroke of a key or a minor change in the machine's program, he noted.

Colorado Passes Crime Bill

DENVER — While 600-plus auditors discussed ways to clamp down on DP security problems at the EDP Auditors Association's seventh International Conference here last week, the Colorado Legislature moved to prevent future computer abuse within the state.

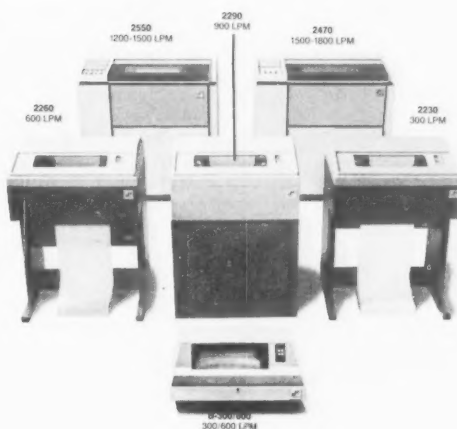
Passed by both the State House of Representatives and the Senate, a computer crime bill was due to be signed by Gov. Richard Lamm this week. However, there was at least one critic

of the country's newest DP crime measure.

Speaking at the conference, Chief Deputy District Attorney H. Jeffrey Bayless described the bill as "not too well-defined" and "too simplistic." Although the DP-oriented bill is a step in the right direction, "It's probably not going to work for us," Bayless commented.

The Colorado measure is based on a similar bill that was enacted in Florida.

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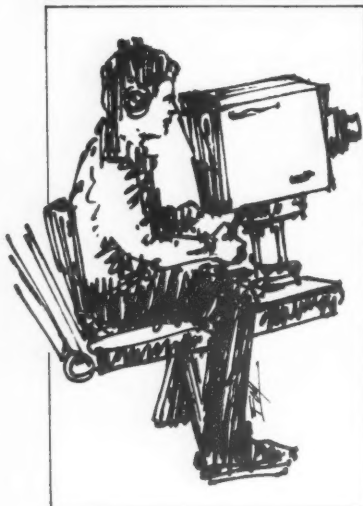
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Speakers Demonstrate: Computers Play Varied Movie Roles

By Marguerite Zientara
CW Staff

NEW YORK — While you may be most familiar with the malevolent film star/computer "Hal" from the movie "2001," there are other, invisible stars in computer form that work behind the scenes in Hollywood to create the illusions we love so much.

In a well-attended session at the recent National Computer Conference, predictably enhanced by numerous film clips, attendees of "Computer Technology and the Movie Industry" got a glimpse of present uses of computers in the film industry as well as the great potential for future uses.

A brief synopsis of the stages of film production was presented by session leader Suzanne Landa of The Rand Corp., who noted the current uses of DP in each stage. While word processing has not yet caught on with scriptwriters, Landa indicated, there is at least one Hollywood writer who has invested in such a system and who accesses the *New York Times* Data Bank as well for background information.

Set Design Savior

Since set design is a very expensive part of the filmmaking process and can cost millions of dollars per set, Robert Abel & Associates has employed computer technology to save time, effort and money in set design for a film to be released in December, "Star Trek."

Line-drawn versions of sets and people are entered into an Evans & Sutherland Picture System 2 through a tablet. For each set, camera angles and moves are determined using the System 2 controls, Landa explained.

In this way, technicians can determine which portions of a set will not be photographed and thus not even need to be built, she noted. In addition, it helps identify areas of a set that may be visible but amenable to a matte effect in place of construction.

Computers Can Act

More and more, computers are appearing in movies because of the popularity of science fiction films, Landa said, noting that many manufacturers donate millions of dollars worth of DP equipment for that purpose, and there is a growing interest in portraying computer graphics as well.

Computers as an aid to live-action filming premiered last year in "The China Syndrome" by Michael Douglas Productions. Eyewitness Ltd. programmed a microcomputer in assembly language to ensure accurate, flexible and reliable operation of the movie's nuclear power plant control panel lights in coordination with the actors' performances, Landa explained.

Besides adding realism to the film, legal considerations dictated the precise duplication of a power plant's interior during the various stages of an alert, she said.

Finally, in the postproduction stages of filmmaking, computer-controlled cameras and three-dimensional models are being used for the first time to add the realistic finishing touches to films. Such 1979 movies as "Buck Rogers" (Universal), "The Black Hole" (Disney) and "Star Trek" (Paramount) will be the first to use such techniques, Landa said.

'Access' for Sound Effects

After the filming of a movie is completed, additional sound effects traditionally are dubbed in at the laboratory in a tedious, expensive and time-consuming process. The sound editor's job, which until now has remained essentially the same for 40 years, entails taking notes on every scene in a film, searching through sound catalogs for the desired sounds, ordering the correct tapes and then painstakingly editing the tapes through trial and error.

Computer technology, however, has

once again come to the rescue in the form of Automated Computer Control of Editing and Storage of Sounds (Access), a machine that took \$1 million and six years to develop, but which increases productivity by four times, according to William Dietrich, president of Mini-Micro Systems, Inc., developers of Access. A sound editor punches CRT keys and can immediately hear any one of a myriad of stored sounds, he explained.

Using a film clip to illustrate the machine's capabilities, Dietrich demonstrated the machine by selecting the sound of a dog barking in the distance. Controlling the volume and speed of the sound, the sound editor can render a tiny, energetic dog barking as well as a very large, lazy dog barking, from the same recorded sound.

There is no deterioration of the sound over time, Dietrich explained, because the sounds are stored digitally. Thirteen disk packs store these sounds, each holding 40 minutes' worth.

Developing Logos

As a user of computer technology in the film industry, Larry Elin, director of animation for Magi in Elmsford, N.Y., described how his company uses three-dimensional, computer-generated graphics for making educational and commercial films.

"Twenty percent of the eye-catching [identification] logos you see in television commercials are computer-generated," he noted, adding that at least 12 U.S. commercial film producers use computers to generate images.

Magi's process for developing the images, called Synthavision, involves photographing images as they appear on a CRT screen, Elin said.

While computer-generated, three-dimensional images are usually made by digitizing objects and then connecting the points to smooth out the image, he explained, Synthavision eliminates the smoothing-out process. "The objects we produce as images in our films actually are geometric shapes that exist in the computer so there are no hidden lines that need to be smoothed out," he said.

Administrative Work

Departing from the more artistic uses of computer technology in the film industry, Al Jerumanis, director of Corporate DP for MCA, Inc. in University City, Calif., described some administrative uses of computers.

For the casting of movie extras, MCA input information on the 5,000 union and guild members into a computer, including name, physical description, general description (robust, skinny), apparent age of the person, skills and useful objects owned by the extra.

Such useful objects could include tuxedos, belly dancing outfits or Rolls Royces, Jerumanis explained. "That saves the studio time; we just rent the object from the person without having to go out and produce it ourselves."

With 150 attributes per person listed in the computer, MCA's casting department has been reduced from 40 people to "four casting directors, two secretaries, four CRTs and a printer," Jerumanis said.

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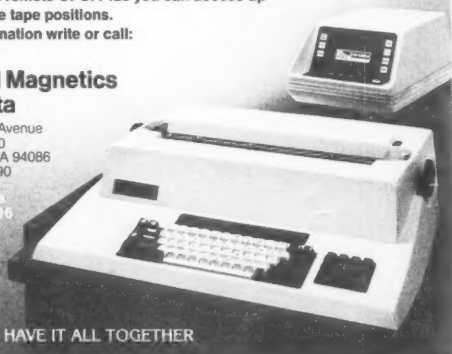
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Superman's CRT Just One Highlight

By Rex Malik

Special to CW

NEW YORK — "Six p.m.," said the conference chairman to the assembled multitude, promising an extra delight ... "Six-thirty p.m.," the speaker, Suzanne Landa of the Rand Corp., promised.

At 5:55 she was busy unpacking Clark Kent. What, I wondered, had Superman to do with computers in the movies?

Did Superman really have a micro-computer stuck in his cranium, up there above those broad shoulders? It is, after all, a remarkably small head. Did she intend to give her opinion of the character? Any man who wears his underpants outside his leotard can't be all that clever.

Landa disappeared under the speaker's table, from which came strange banging sounds. The russet cloth waved and billowed mysteriously. Superman's knees appeared above the table, and just as quickly disappeared.

Eventually, Superman arose in all his majesty, not a hair out of place, carrying a CRT terminal.

Landa surfaced, slightly disheveled. And all was revealed: Superman was a cardboard cutout, propped up with a piece of wood. Landa vanished again — still the only one doing any work.

Meanwhile, the obligatory bystanders had appeared, all of them giving directions: Two cheers for equality?

And then she resurfaced, this time with Wonderwoman. Meanwhile, the experts were clustering around Superman saying, "I ain't seen a terminal like that," and making other appropriate, highly technical comments.

At least the crowd hid those underpants.

Wonderwoman was carried away. There was no sex on the official National Computer Conference program — not even, it seems, propinquity. And Landa disappeared again, this time carrying two carousels.

Men wandered in carrying drinks. The chairman got up and said, "A few minutes more ... Why don't you go and get yourself a drink?" So I did.

At 6:40, when I was well into my second drink, Landa returned, stood next to the podium and put the microphone cord around her neck. It broke.

And we were in business ... Lights down. "Say computers to people," she said, "the man on the street, and he says robots."

The first robot on the screen, of course, was from Fritz Lang's "Metropolis" (1926), and naturally, it was female. The next — and there was a long gap — came from "The Day the Earth Stood Still" (1951). Perhaps she missed one?

Then, in succession, came Robby from "The Forbidden Planet," C3PO and R2D2 from "Star Wars," and Twikki from this year's "Buck Rogers." It was with "Sleeper," "Westworld" and "Futureworld" that you could see the works.

"If you look at the film index," Landa said, "you get this running order — composers, computers and con men."

And it was on to pictures like "1984" and "Alphaville," in which the Galaxy is ruled by Alpha 60. She flashed up a printed document which said that Alphaville's working title was "Tarzan

vs. IBM."

She followed by pointing out that in "Billion Dollar Brain" the billion dollars was only for the hardware; the software was extra.

With "2001" we entered the world of the anthropomorphic computers, and although you don't see the computer in "Barbarella," "a successful interaction only occurs as long as Jane Fonda remains on her knees," Landa said.

Hollywood's propensity for getting it wrong, of which she has many examples, is perhaps at its best with "The Forbin Project" in which two giant systems, one Russian, one American, join to rule the world — though Guardian and Colossus only communicate with each other at 1,000 word/min.

As for Disney's "The Computer

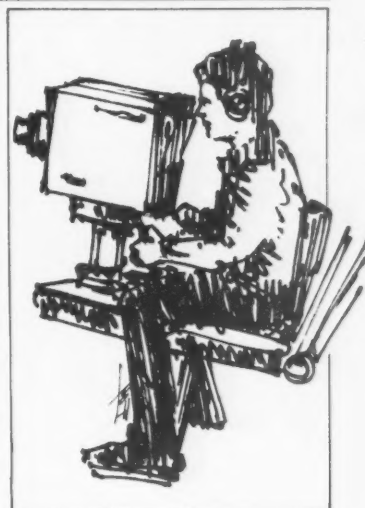
Wore Tennis Shoes," the press release stated that "credibility is a rule of thumb ..."

And then came the real bombs: Warner's "The Phynx," in which a computer plans the rescue of U.S. citizens trapped in Albania, the chosen emissaries being a rock group.

There's "The Gladiators," a Swedish picture concerned with a peace game supported by a spaghetti manufacturer. (I am not making this up as I go along.)

But its with "Flesh Gordon" that she hit it right. It was nominated for a special effects Oscar — or would have been. That year, the Academy dropped the category.

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People Relationships Seen Key to Manager's Job

By Howard A. Karten
CW Staff

NEW YORK — Forget all that goody two-shoes stuff you learned about being a manager if it didn't stress the behavioral aspect of managing people.

Most of a manager's job involves handling lateral relations — business relations with peers in other departments — and most courses and advice on how to be a good manager have tended to downplay or neglect this aspect of the job, according to Loretta A. Pitchell.

Discussing "People Power: The Key to Effective Management of DP Projects," the senior account manager for Burroughs Corp. in Atlanta said at the recent National Computer Conference

here that most management is more frustrating than most management scientists believe. Few people today want to be managers, she added.

One of the reasons for this frustration, Pitchell said, is that "the manager's job is contradictory. For example, subordinates need to be given a clear understanding of their jobs and boundaries, yet these jobs and boundaries often overlap and are blurred.

"Also, managers need to establish routine and regularization to obtain efficiency, yet [this] must be sacrificed to introduce change. Early training in management says 'we define the rules and that's the way it will work,' but that isn't necessarily the way of the real world," she observed.

To be effective, managers must establish six different kinds of relationships, Pitchell asserted. These relationships are in the areas of workflow, service, advisory, audit, stabilization and liaison.

For example, workflow relationships deal with those to whom the manager sends and from whom a manager receives work. This might be a data entry department; two obvious workflow relationships would be the department submitting the raw data and the input departments.

By contrast, advisory relationships deal with those to whom one goes for aid on a specific problem or those who come to the manager with a request for help, she indicated.

In any case, the key concept is for managers — and others both in and outside DP — to become systems managers, Pitchell stated. "The word 'system' [means] interdependence; managers do not live in a vacuum," she emphasized. "That would be nice, but it wouldn't work."

In addition to dealing in interdependent systems and establishing a network of relationships, managers should realize that managing a DP department involves two concepts: managing projects and managing change.

Managing change is itself a three-step process — intervening when necessary, restructuring work and making major reorganizations — that is intricately involved with people management, Pitchell explained.

There is a four-step loop in helping people through changes, she continued. First, a manager should seek change when people who are going to have to do the changing are distressed and feel they have a problem; next the manager should "get a consensus on what kinds of data and what method of data collection and assessment the group will accept as valid for evolving a solution to its problem"; third, the manager should make feedback the critical element; and, finally, "you must aid people in coping, skill transfer, experimenting with the new methods."

The cycle should then be repeated, she said.

According to Pitchell, the point of her advice was that project managers deal primarily with time and the organizational process, not with technical variables; project managers need a variety of behavioral and facilitative skills to manage their teams and, perhaps key to everything else, "leadership is action, not position."

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Managers Draw Fire For Mismanaging Time

By John Whitmarsh
CW Staff

NEW YORK — Are your projects completed on time? Are you satisfied with your time estimates? Do you use your staff time wisely?

Most DP managers would answer "no" to all three questions, believes Hudson E. Henry, management consultant with Day-Henry Associates, Inc. of Salem, Ore.

Few DP managers have time on their hands because few know how to man-

age it properly, Henry said. The judicious management of time — his own and his staff's — is a DP manager's most important job, he told a National Computer Conference audience here recently, yet few managers do it well.

In business, time is measured in dollars, not minutes, and in human costs, not machine costs. As hardware and software prices decline while manpower costs continue to climb, "the major productivity drive is turning from hardware and software to 'peopleware,'" Henry said.

Time Logs Suggested

In terms of salary alone, a manager's time "costs" more than a programmer's time and ought to be used more wisely, Henry said, suggesting a time log can help. A time log tracks how a manager spends his time, minute by minute, day by day.

While a time log is done on and for a manager, it is usually not done by him. It requires another person in the office (preferably an attentive secretary) to note how a manager spends his time and to record his activity every 15 minutes of every workday for two weeks. A time log should be done at least once a year, preferably twice, Henry said.

Chances are the time log will reveal as many surprises about what a manager doesn't do with his time as what he does do. Managers generally use a time log to find answers to these questions:

- "What am I doing that doesn't have to be done at all?"
- "What could be handled as well or better by someone else?"
- "What do I do that wastes the time of others?"
- "Am I really doing what I want to do in my career?"

(Continued on Page 14)

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Instant Answers Unnecessary Top-Level Execs Seen Reluctant to Automate

By Marcia Blumenthal
CW Staff

NEW YORK — Contrary to predictions made by DP managers and systems vendors, top-level executives are not eager to have desktop computers or terminals grace their offices. In fact, today's corner office set, for the most part, couldn't care less about using computers to help make business decisions.

Why the apathy? "The nature of a chief executive officer's [CEO] work does not require instantaneous solutions to problems," explained Neil Churchill, president of Patten Corp. and a professor at Harvard Business School.

Churchill participated in a panel discussion of top-level executives' attitudes towards using computers at the National Computer Conference.

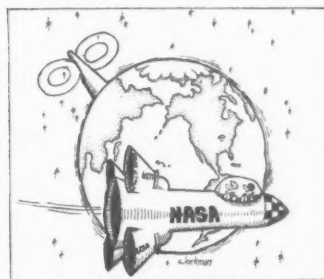
Top-level executives spend a good deal of time evaluating risks and assessing the quality of a subordinate's work — interpretive tasks requiring little additional hard data, Churchill noted. A top executive's involvement with DP is generally limited to decisions such as hiring the DP executive, allocating financial resources to DP needs and evaluating the efficiency of the DP dollar.

Variety in Data Gathering Methods

Agreeing with Churchill was Herbert Z. Halbrecht, president of Halbrecht Associates, an executive search firm. In a study he conducted recently of the way CEOs use computers, Halbrecht found that, in general, executives do not care to use automated equipment directly.

Halbrecht's study found that top managers use a variety of methods to obtain useful data. One executive demanded monthly performance summary sheets, with variances from every operating unit of the company. After examining these reports, he would pick up the telephone and speak with his line managers directly about any serious problems.

Another executive thought computers were too slow for his needs.



'Funny, We Never Noticed It Before.'

Significant events that occurred during the day were written on transparencies, projected on the wall and then televised to various managers' offices. If the event were particularly serious, the CEO had buzzers sound in his managers' offices to direct their attention to the TV screen.

While this technique may appear silly, it worked, Halbrecht said, adding that the company is a highly profitable and well respected firm. When a top-level executive uses a computer in his work, it is usually in a way peculiar to his style of management. The CEO adapts the company to his style rather than the other way around.

Considering the ages of today's executives,

it is highly unlikely that these executives will adapt to computer technology easily or willingly, Halbrecht stated. In 15 to 20 years, middle managers finding their way to the executive suite will be more receptive to automation because they will probably have used these techniques earlier in their careers, Halbrecht suggested.

Personality Differences

The personality differences between DP managers and CEOs may account for some of the frustration DP managers have experienced selling top management on the benefits of computers, noted James C. Emery, president of Educom.

Executives tend to look at the problem as a whole, solving problems with social skills, whereas management information systems personnel approach problem-solving in a sequential way, he observed.

Despite the generally negative attitudes CEOs have toward using computers to help make decisions, some panelists thought executives could be won over to using computers.

Demonstrating a cost savings is the surest way to break down a top-level executive's resistance to using a computer, to help his business decisions, according to Tom Labrecque, executive vice-president of the Chase Manhattan Bank.

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'Almost Unbelievable' Third World's DP Infancy Attributed to Isolation

By Jeffry Beeler

CW West Coast Bureau

NEW YORK — Limited contact with the outside world has kept many developing nations in their DP infancy.

That theme emerged here recently during a National Computer Conference seminar on the status of computing in Third World countries.

George Sadowsky, a technical advisor with the United Nations' Statistical office, portrayed developing nations as suffering from an "almost unbelievable" isolation that severely restricts the flow of DP information from more technologically advanced countries.

Sadowsky cited an example of one Latin American nation where the local computing professionals and technicians had never heard of any of the industry's major trade associations, publications or conferences, including NCC.

Product News Lacking

Third World countries also suffer appalling ignorance about available products. This phenomenon particularly applies to nations where a foreign vendor enjoys a monopoly and routinely conceals the existence of competitive offerings, Sadowsky said.

In the midst of such an information vacuum, computing resources can hardly be expected to emerge and flourish, he pointed out.

To boost the third World's level of computing expertise, Sadowsky urged an increase in the flow of technical information from more technologically advanced nations. The Association of Computing Machinery and other professional societies can prove particularly valuable vehicles for such technology transfer, he said.

Edward Robertson, a University of Indiana computer science instructor, voiced similar sentiments and urged U.S. computer personnel to cultivate "pen pals" among their Third-World counterparts. He also suggested they supply those contacts with discarded DP textbooks and other information whenever possible.

Besides serving the obvious purpose of expanding the Third World's DP horizons, increased imports of computing expertise from developed nations can relieve the drain on the emerging countries' foreign exchanges, Robertson explained.

If developing nations have to rely on outside sources for most of their programming as well as their hardware, the resulting expenses can prove staggering. But with a large transfusion of overseas computing information, the Third World can improve its general level of programming expertise, cut its reliance on foreign software suppliers and thus eliminate one of the largest expense items on its roster of DP imports, Robertson added.

Rate of Absorption

Four factors determine the rate at which developing countries can absorb computing technology, Sadowsky said. These factors include:

- The extent to which air conditioning, suitable electric power and other environmental prerequisites are available.
- The extent to which a country has evolved a complex university system and a large pool of skilled labor.
- market size.
- The extent to which the general public is inclined to accept DP.

Managers Misuse Time

(Continued from Page 12)

"Time robbers" interrupt every manager's day, Henry pointed out. Too many meetings, excessive phone calls, bottlenecks and continuing crises are time robbers.

How to handle them? Employees at the managerial level or above should spend only 25% of their time in meetings, according to management consultant Peter Drucker. Telephone conference calls can replace many face-to-face meetings, Henry added.

Just how do DP managers spend their time on the job? A survey of 36 industrial DP projects around the country last year found this time distribution:

Requirements	8%
External and Internal Design	12%
Code, Test and Integrate.	68%
System Test (Including Installation/- Evaluation)	12%

Another recent study pointed up the vast differences between what a DP project costs and what a manager thinks it costs. The managers surveyed said the design of a system costs 40%; it actually takes 12%. Coding and testing, which managers said cost 20% and 40%, respectively, actually cost 6% and 12%.

And system enhancement, to which the managers assigned no funds, actu-

ally eats up 70% of the project cost.

The point of the two studies is this: Getting the requirements for a DP project takes the least amount of time (8%), but failure to get those requirements right in the first place extracts the greatest cost penalty (70%), Henry explained.

By extrapolation, Henry said that 15% to 20% of the input provides 65% to 85% of the output or impact. Management's domain is the 15% to 20% of the projects that will yield the greatest effect.

Others Pressed, Too

DP managers are not the only ones pressed for time, Henry said. More than 50% of a programmer's time may be spent on clerical tasks such as redrawing diagrams, keying operations, picking up runs, typing and maintaining program libraries.

There is, in fact, considerably less work time available than most managers realize. Henry urged his audience to subtract such nonwork days as weekends, sick days, holidays, vacations, accidents and training time from the 365-day year.

What's left, Henry figures, is about 175 work days per year or about 5.5 hours per day — not the eight hours managers expect from their employees.

DP Wins Important Place On U.S. Olympic Team

By Brad Schultz

CW Staff

NEW YORK — Computer technology joined the U.S. Olympic team this month with Data General Corp.'s donation of a minicomputer and Megatek Corp.'s gift of a CRT terminal for use in training athletes.

Although humans have not yet been named to the team, DG's Eclipse S/250 and Megatek's Whizzard 7000 terminal are sure to be factors in the 1980 Olympic Games. The hardware will drive a unique Biomechanical Analysis System (BAS) that spots flaws in the technique of performing athletes.

At the recent National Computer Conference here, Col. Don Miller, executive director of the U.S. Olympic Committee, said the equipment "will provide lasting benefits to great amateur athletes in the Olympics and other international competitions."

With the system, a film is made of the performing athlete at 10,000 frame/sec, then developed and broken down frame by frame. A digitizer pen scans various portions of the body in each frame and simultaneously feeds these tracings into the Eclipse and the Megatek 7000.

Using the equations of Newtonian mechanics, the Eclipse calculates the velocity, acceleration, direction and forces generated by the body's segments and provides a readout of the athlete's strengths, weaknesses and possible alternatives for improvement. Meanwhile, the Megatek 7000 converts the digitized body tracings to stick figure representations.

The Eclipse output and Megatek animation suggests changes, such as shifting the stance of a discus thrower to allow quicker release, which could improve performance.

Discus Dynamite

An Israeli-born scientist, Dr. Gideon Ariel, developed the BAS and will direct its use at the newly-formed U.S. Olympic Committee Biomechanics Laboratory in Colorado Springs, Colo. Ariel reportedly used similar technology in helping Mac Wilkins win the 1976 Olympic gold medal for the discus throw and Terry Albritton set a world record in the shotput.

Wilkins was throwing the discus less than 220 feet before Ariel began working with him. In the Montreal games, his winning heave went more than 232 feet.

However, Wilkins may have a more difficult time in Moscow next year if he faces the current focus of Ariel's attention: 44-year-old Al Oerter, a four-time Olympic gold medalist who is trying to make a dramatic comeback after a decade in retirement. As a member of the Israeli team, Ariel competed against Oerter in the 1960 and 1964 games.

The 275-pound Oerter, an engineer for Grumman Data Systems who has specialized in DP since 1962, demonstrated Ariel's system at DG's NCC booth by bringing his foot down rather casually on a special platform. A force of more than 1,100 pounds was registered. In competition, the same movement — part of Oerter's throwing twirl — generally tops 2,000 pounds.

Besides working with amateur athletes, Ariel has brought his methods to

the Dallas Cowboy and New England Patriot professional football teams, to the Kansas City Royal pro baseball team and to tennis pros, including Jimmy Connors. He has also compared the golfing styles of Jack Nicklaus and former President Gerald Ford.

According to Ariel, Ford had a smoother and faster swing than Nicklaus, but his timing was less efficient. Nicklaus snaps his club.

"We measured their centers of gravity," Ariel recalled. "Ford shifts his center from a position 30 centimeters behind his left foot to 19 centimeters behind it, a displacement of 11 centimeters. Nicklaus only moves three centimeters."

"That may not sound like much, but it makes a tremendous difference in the swing."

Bridges and Brawn

"No engineer would construct a bridge without calculating all the stresses and forces involved. Coaches should essentially do the same thing in the training of their athletes," Ariel has observed.

"Every type of movement or stress, whether it be human or mechanical, is based on [Newtonian physics] — laws hundreds of years old. What I have done is add modern computer technology."

The vice-president of Amherst, Mass.-based Biomechanical Analysis Corp. believes his methods and other types of specialized training should be available to children with athletic potential.

"Until 1964, talent alone was good enough to win," he said. "Since then, however, sport has become a science, not an art. We have the best scientific know-how in the world and can provide our coaches with the best training tools. Why not use them?"

But the Olympic Committee's Miller declared that with the adoption of Ariel's system, made possible by DG and Megatek, "the U.S. is unsurpassed in sports technology because of our ability to manipulate such large banks of data."

Ariel began developing the BAS on a Nova 3, according to a DG spokesman, who said DG may eventually market sports-oriented computer products. The Eclipse configuration going to Colorado Springs is valued at more than \$200,000.

Critical Contribution

Megatek's contribution was equally critical, according to Ariel. "Without graphics, the system would not work. It's almost like trying to determine how fast you are going in a car without a speedometer — impossible."

"With the [7000], coaches and athletes ... can easily try out new techniques and approaches before physically practicing them. The time and physical effort saved will be tremendous."

San Diego-based Megatek's \$50,000 gift included the Whizzard 7000, a graphics tablet and tablet interface, a joystick with control switch, a joystick interface, a dual monitor interface, an electrostatic printer/plotter interface, Fortran graphics software and the vendor's HCRST module for three-dimensional displays.



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Women Seen Suffering 'Subtle' Discrimination

By a CW Staff Writer
NEW YORK — The battle of the sexes in business continues on a new front, according to Ida W. Mason, professor of data processing at Lehigh Community College, Schnecksville, Pa.

"Sexual discrimination in business has been eliminated by law, but subtle discrimination still exists," she told a mostly female audience at the National Computer Conference here recently.

Mason speaks from experience on the job and in research. She holds an M.B.A. degree, has 15 years DP experience and is actively involved in primary research on women in business.

Mason explained the present

relationship of men and women in business by reviewing the biological, social and cultural differences of the sexes.

"I want to make you aware of these differences because awareness precedes change and a change in awareness precedes a change in attitude," she said.

Cultural Distinctions

Of the biological, social and cultural differences between men and women, the cultural distinctions are the most important, Mason said.

"These cultural differences are more significant than the biological and social ones, and these can be changed," Mason said, adding that differences

do not mean inferiorities.

But cultural differences are not changed because schools and teachers discourage role reversal and insist that girls play nurse and boys play doctor, Mason charged.

Cultural differences lead to different perceptions of the business world by men and women, Mason said.

For example, a man thinks of his job as one part of his career; a woman thinks of her job now and her career later. Ninety percent of women surveyed did not know what they would be doing in five years, but 90% of men did know, she reported.

Male career choices are early and deliberate; female career choices are late and accidental.

Males are well versed in corporate strategy skills; females are unaware of them.

Males tend to be boss-oriented and do what their supervisor wants; females are self-oriented, believing they will be judged and promoted on their abilities alone.

Communications Patterns

Communications patterns between men and women are different, surfacing not only in more flowery speech among women but also in dress codes, Mason stated.

Attempts by women to copy the male look in business have bombed, Mason said. The imitation man look, in which women don blue pinstripe suits because that's what the men are wearing, does not help a woman climb the executive ladder. Ruffled blouses, long hair, poorly fitting

clothes, unmatched skirt and jacket and boots are other no-no's in the business world, Mason warned.

Shoulder-length hair, an attache case (with removable purse inside), man-tailored blouse and a contrasting scarf are suitable female executive attire, she said.

The American labor force includes 40 million women who work, but 75% of them work in only five occupations: elementary school teacher, secretary, waitress, bookkeeper and domestic.

Some women do hold executive positions. One out of 18 holds a managerial post, Mason said, but that is usually in a small retail store.

Moreover, despite the fact that the U.S. work force has tripled since 1940 and despite the women's movement, only 5% of all executives are women, compared with 4% in 1940, Mason said.

Women have no more broken into education than they have into business, Mason said. For example, from 1970 to 1976, only 16.8% of the bachelor degrees in computer science, 12% of the master's degrees in that field only 6.6% of the doctorates went to women.

Subtle discrimination con-

tinues in salaries as well. U.S.

Census figures reveal that women's median salary in the computer sciences is only 78% of men's, Mason said.

Even at the secretarial level, men earn more than women for the same work. The average weekly salary for a male secretary is \$179 as opposed to \$145 for a female secretary, according to Mason's figures.

Who is the typical female DP manager? Mason quoted *Computerworld* survey statistics showing her as 30 to 40 years old, earning \$30,000 to \$40,000 per year and holding a B.A. or higher. In addition, she has spent 10 to 15 years in DP and has held an average of 4.7 jobs in her career.

What does Mason see ahead for women in business? She sees continued gains and penetration by women into the executive ranks, but the key stimulus will be a reduction in sexual discrimination.

First, top management must be committed to Equal Employment Opportunity (EEO) legislation, she said. Beyond that, she prescribed three means of reducing sexual discrimination: create a positive corporate environment, resocialize men's and women's attitudes and train women and men for management.

Steps to Success

Women need not sit idly by and suffer the slings and arrows of subtle male discrimination around the office. Lehigh Community College professor Ida Mason recommends these 12 steps:

1. Establish your priorities.
2. Be assertive.
3. Speak up.
4. Take risks.
5. Maintain career visibility.
6. Focus on the relevant.
7. Accept responsibility for your actions.
8. Learn to live with trial and error.
9. Be patient.
10. Be self-confident.
11. Look out for yourself.
12. Help other women.



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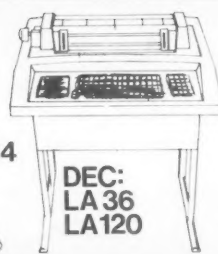
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New Guidelines Issued For Olsten Competition

WESTBURY, N.Y. — New guidelines that simplify procedures for organizations that wish to receive consideration for the Third Annual William Olsten Award for Excellence in Records Management Programs were announced recently.

The award was established "to bring recognition to the significant advances and growing importance of records management in today's complex business environment," according to the Olsten Corp., the award's sponsor.

Cost effectiveness will be figured as a percentage of the total expenditure as well as

gross figures so an organization with a high percentage but lower dollar savings can compete with larger companies.

Contestants must now describe how their systems meet each of seven criteria including creativity, innovative qualities and planning and staff training, on separate single sheets of paper to simplify reporting requirements.

Deadline for entries is July 16, and all interested organizations can obtain more information from Patricia L. Morse, senior vice-president, The Olsten Corp., One Merrick Ave., Westbury, N.Y. 11590.

Interaction Skills Stressed Ways Noted for DPs to Open Verbal Closets

By Howard A. Karten

CW Staff

NEW YORK — If it's true DPs have trouble communicating and listening, what can they do about it?

Dr. Gilbert Kaskey, director of Human Resources Development at Univac, who noted that communications problems are universal in the work world and not limited to the DP industry, oversees several programs aimed at improving communication.

"We run development programs for individuals that hopefully take them through all areas of personal development, and we include oral and sales presentation in these programs. We give marketing courses that give the salesman the technical information he requires regarding a system we sell, but we go further than that and teach a salesman the best methodology for selling a system," Kaskey said.

"We give courses in man-power development that involve all sorts of specifics about communication, whether it's how to deal with a subordinate in a performance evaluation or a more general matter.

"We cover just about every facet of communication, from the more psychologically oriented transactional analysis all the way through the types of communication involved in particular jobs," he noted.

Bob O'Hare of O'Hare and Co. also spends a good deal of time training DPs to communicate better.

Communication Classes

"Communication can be approached academically," he said. "You can study it, people and interpersonal relationships, and in studying the field, you can learn what makes better relationships and what makes people work together.

"If you work at it in the same way you might work at improving your technical DP skills, you can become far more effective. DPs go to school and study technical subjects like programming languages and Boolean logic, but we do not take courses in interpersonal relationships, communication and human relations. And we absolutely should," O'Hare stressed.

"The DPer has to become aware of how he's hurting himself. That can be done by getting feedback from user groups. The DPer can ask users, 'How well are we doing? How do you like our products? Are we meeting your needs?' and questions like that.

"By opening up that dialogue between the insider and the outsider, DPs are going to find out that they are not on target and that, hopefully, will disappoint them and create some discontent," he added.

That disconnect is a good motivating force, O'Hare suggested because it can help people see that they are not performing as they would like. The psychological phenomenon called selective perception — the screening out of negative information, so the individual gets a better picture of himself — is at work here, and although it is not an easy job to get people dissatisfied with their performances, it is a necessary part of the change process.

But the desired changes in communication behavior should come before, not after, an individual is promoted.

"The people who make the best supervisors are the ones who are fortunate enough to be prepared and have an understanding of human relations and

Since communication skills are often either unavailable or not emphasized in graduate and undergraduate college programs, DPs must go elsewhere to

This is Part 2 of a story begun last week in which two individuals, who are heavily involved in the human side of DP, argued that DPs typically have trouble communicating. This week the conclusion discusses how DPs can overcome the problem.

communication. That can come from study; leaders are made, not born, the consultant said.

learn them. Seminars, courses in adult learning institutions and books are good sources O'Hare said. Among the

books he favors are many of the ones published by the American Management Association in New York, J. Keith Loudon's, *Making It Happen* and Dale Carnegie's *How to Win Friends and Influence People*.

"I heard about Carnegie's book when I was in engineering, and I laughed because it sounded so dumb and insincere. But after I read it, it changed my life.

"It really made a difference. It opened my eyes to the human side of life, and I really did enjoy developing those human relations habits. So I think the book could be recommended to DPs, and maybe half of them will really turn on to it," he said.

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More than a computer company

AT&T Subsidiary for Hybrid Services Predicted

By Jay Woodruff

CW Staff

NEW YORK — If AT&T is allowed to market a hybrid DP and communications service, it will very likely be required to establish a separate subsidiary for that purpose.

Although four lawyer-panelists discussing the computer communications market here at a session of the recent National Computer Conference agreed that a subsidiary organization would enable AT&T and other parts of the industry to avoid regulation, they were not certain about the degree of separation that would be

needed to satisfy the Federal Communications Commission (FCC).

Voice and basic nonvoice communications will probably continue to be regulated in the traditional manner, according to John Lyons Jr. of the National Telecommunications and Information Administration in Washington, D.C.

There was also agreement that for all the technological expertise the U.S. possesses, the process of incorporating data communications into the mainstream of society has been held up by antiquated laws and regulations.

Bob Ross of Southern Pacific Communications Corp. in Washington, D.C., said an entire industry never envisioned by the creators of the Communications Act of 1934 has arisen, making that act obsolete. The lack of an integrated package approach to setting up communications systems on the part of vendors has further confused communications technology.

Changes in the "cast of players" in the communications arena, with its proliferation of small, often undercapitalized companies, has made it difficult to develop a coherent approach to data communications, Ross said.

Trend Toward Deregulation

In mid-May an FCC proposal that Ross said will probably be called "Computer Inquiry Three" suggested that a common carrier be allowed to go about its business without regulation if it separates itself from its data communications subsidiary by erecting a tariff between them.

However, the commission is not closing the door on alternative suggestions, and the question might be opened to comment, as might the question of whether regulation is needed at all.

Ross said the commission is to be commended for taking a fresh look at the barrier to computer communications,

but legislation introduced in Congress may beat the FCC to the punch. Sen. Barry Goldwater's (R-Ariz.) Senate Bill S.622 would allow AT&T to engage in any computer communications business it desired. "Less, not more regulation, appears to be the trend," Ross said.

Noting that laws "rarely precede change, but rise to interpret and regulate" what has happened before, panel participant Gregg Scall said there is a problem of "connecting 20th or 21st century interests with past laws' precedents."

Cases are normally decided by precedent, but with such great technological advances in computers and communications in so short a time, it may be inappropriate to cite the past in order to judge the present, he indicated.

Relief Signaled

Development of general, large-scale data base or teletext services has been held up by barriers "that were fashioned, presumably, with other regulatory objectives in mind," according to Terry G. Mahn of the Toth and Mahn law firm in Reston, Va.

Mahn said application of these regulations has put the U.S. behind Europe in the development of teletext services, even though the U.S. has a five-year edge in the develop-

ment of data base systems.

"However, the rule changes that appeared in a tentative decision by the FCC in mid-May 'seem to signal imminent relief,'" Mahn said.

Through revision of its rules, the FCC has lowered the barriers to teletext development, with the result that AT&T and other so-called resale carriers "may now be stimulated to enter teletext markets," he said.

The commission has also indicated that it will entertain requests for waivers of the rule requiring a common carrier to separate from its subsidiary, especially where smaller competitors are concerned, he added.

Mahn also touched on the barriers facing broadcasters interested in entering the market. The broadcasting spectrum suitable for teletext systems is attractive to other organizations and public interest groups as well, he said.

Also, the FCC restricts point-to-point broadcasts, even though an experimental service provided by a VHF television station in Salt Lake City, Utah, has shown "a strong demand by subscribers for the capability to perform person-to-person message communications — or send electronic mail," Mahn said.

Mahn said that since the FCC's attempt to define technology has gotten it into trouble, its future definitions may be less rigid, and it won't be so inclined to "run old rules around new equipment."

He added that the FCC cannot always move quickly because it is forced to consider complaints about instituting new ideas even when the complaints have little merit.

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July 15-20, Cambridge, Mass. — The Second Annual International Users Conference on Computer Mapping Hardware, Software and Data Bases, sponsored by the Harvard Laboratory for Computer Graphics and Spatial Analysis. Contact: Kathleen Devaney, Center for Management Research, 850 Boylston St., Chestnut Hill, Mass. 02167.

July 16-18, Toronto — 1979 Summer Computer Simulation Conference (SCSC). Contact: Dr. A.J. Schiewe, SCSC '79 Chairman, c/o The Aerospace Corp., P.O. Box 92957, Los Angeles, Calif. 90009.

July 16-18, Boston — Design and Selection of Minicomputer Systems. Contact: American Management Associations, 135 W. 50 St., New York, N.Y. 10020.

July 16-20, New York — Data Base Concepts and Design. Contact: American Management Associations, 135 W. 50 St., New York, N.Y. 10020.

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With On-Line, Distributed DP Growing Lack of Training for System End Users Scored

By Marcy Rosenberg

CW Staff

NEW YORK — The proliferation of on-line systems and distributed data processing has spawned a new breed of industry professional, dedicated solely to providing DP training for the first-time end user.

However, a growing need for end-user training often goes unmet because many companies deem the cost of setting up such training programs excessive, according to Vicki McConnell, manager of user training for Carter Hawley Hale Stores, Inc., a major U.S. retailer based in Los Angeles.

Speaking at the National Computer Conference here recently, McConnell cited statistics from MSS, Inc., a Dallas consulting firm, that indicate the average DP budget does not provide for any kind of end-user training. In an average budget, 70% is spent for DP department salaries and only .5% for training the DP department's staff.

And "that .5% represents technical training not end-user training," McConnell lamented.

Many companies that do offer user education programs unknowingly add to the cost of such programs by using as teachers programmer/analysts instead of professional end-user trainers, who command lower salaries and can better communicate with the user.

The average senior systems analyst earns an annual salary of \$20,300, while the average trainer earns \$16,809 a year, according to McConnell.

Another costly problem associated with systems analysts is that they become married to the systems they have used, making them less flexible, she added.

Unfortunately, those organizations that believe they can cut costs by not providing preliminary end-user training end up paying more for the consequences. "Delays in implementation cost money, as does a user's inability to generate test data if files become out of balance," McConnell noted.

The importance of user training is also underscored by a number of emerging industry trends. According to McConnell, these include:

- The migration of CRT terminals into an increasing number of end-user environments, such as grocery stores, hospitals, and hotels.
- The role of distributed processing in placing more responsibility for systems design with the end user.
- Increased availability of inquiry languages that allow the end user to communicate his needs to the computer, but not to program the computer to implement those needs.
- The impending "office of the future," which will make CRT terminals

a standard office fixture for non-DP users.

- The requirement that users understand their legal liabilities relating to handling and disbursing data.

- The growing dependency of many user organizations on computers for immediate, up-to-date and accurate information.

McConnell outlined five approaches to user training. The first, a one-to-one method, offers several advantages. For example, it can be tailored to the individual's age, experience, learning rate, fears and depth of material to be learned.

In addition, this approach provides the best control over user security

clearance for use of on-line systems and provides immediate feedback to the user as he interacts with the CRT terminal.

Other methods such as group or lecture approaches are less desirable because they don't offer the user hands-on hardware experience, McConnell said.

The most suitable training procedure for state, regional or national terminal network training, however, is "programmed learning" because it allows for immediate updating and standardization of course material. Programmed learning can be implemented through computer-assisted instruction (CAI) using a software program such

as IBM's Interactive Instruction System, Boeing Computer Services Co.'s Scholar Teach III or Control Data Corp.'s Plato to author on-line training courses, McConnell said.

To use this resource, however, requires enough memory to support it, sufficient staff to author courses and install the systems and adequate funds to lease the programs.

McConnell termed the fifth teaching approach "liaison," a "train-the-trainer" concept. Here, one representative from each user department receives instruction from an end-user trainer in or outside the DP department and in turn trains other users in his department.

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Graphics Net to Cull Data From 18 Agencies

By Tom Henkel
CW Staff

NEW YORK — A graphics network linking the President and Congress with information and reports from 18 government agencies is being developed by researchers in Washington, D.C.

Described at the recent National Computer Conference here, the Domestic Information Dispatching System (Dids) uses a Digital Equipment Corp. PDP-11 processor along with high-resolution color printers to provide immediate graphics information to aid legislators in decision making.

White House aide Edward K. Zimmerman said the system is an offshoot of a National Aeronautics and Space Administration (Nasa) weather moni-

toring system that used satellites to photograph the earth. The color pictures were then reproduced on high-resolution printers for analysis.

Charles Buffalano, assistant administrative director of the Nasa Goddard Space Flight Center, said it wasn't difficult to adapt the Nasa project. "It's not much of a trick if you have the right technology," he explained. "It wasn't very hard for us."

The experimental system creates a real-time data base, drawing from each of the 18 agencies involved in the project. If an official needs a county-by-county breakdown of unemployment figures, for example, the printers can reproduce a color-keyed map of the U.S. showing unemployment statistics for each county.

Researchers say the system, when fully implemented, will be a boon to legislators who have to make split-second decisions. But not only will the system help legislators who know what they want, it will save a lot of time for those who don't.

Joseph Duncan, director of the Federal Office of Statistical Policy and Standards, a division of the Commerce Department, said about 90% of government policymakers don't really know what information they're looking for. The policy to date has been to collect all the data on a given subject, then filter out the unnecessary information — a process Duncan called "terribly inefficient."

With maps and graphs on the color CRT terminals, legislators tend to ask more specific questions, Duncan noted.

'Monumental Task'

Dids is not without problems, however. Finding the data and putting it into readable form is "a monumental task," according to Duncan.

"As an analyst, you don't know what data is where. Most of it is undocumented and unreadable," he said.

Even the data that is documented sometimes presents a problem. Data stored on other computers for other government agencies can't always be

easily read into the PDP-11.

Since the project began, more than 200,000 reels of data have been processed.

Dids Doing It for DOE

James C.T. Poole, a math and computer science researcher for the Department of Energy (DOE), one of the 18 agencies involved in the project, said Dids has been an important addition to the department. "It's not because we don't have enough computers," Poole said, but because the system provides invaluable data from other agencies.

As an example, he noted DOE can pinpoint the locations of the gas in the country, but it cannot pinpoint the greatest concentration of cars. By using Dids, that information is available.

Robert L. Chartrand, senior specialist for information and science for the Congressional Record, said Dids has

brought a great time savings to his group, too.

"We are faced with an inundation of requests for information and assistance," Chartrand said. The Congressional Record gets about 23,000 requests each day for information from congressional staff members.

Chartrand expressed concern about the quality of data going into Dids. "We have to have confirmed data. It must be something we can rely on," he said.

Queries to Dids take anywhere from three to 30 seconds, depending on the complexity of the information requested. Buffalano said hard-copy prints of the CRT screen can be produced by taking a picture of the high-resolution monitor and reproducing that on a color copier.

The printer can change color patterns on-line for more detailed analysis of a given subject.



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Charges Revised In Fraud Case

LOS ANGELES — Two men arrested recently by the Federal Bureau of Investigation and charged with the illegal wire transfer of \$1.1 million from City National Bank in Beverly Hills have been indicted on revised, more serious charges.

The men allegedly spent the entire \$1.1 million on 15 diamonds, four of which are yet to be recovered, an FBI spokesman said.

Originally charged with one count of fraud by wire [CW, March 28], Michael Joseph Kelley, 27, and Richard Albert Warren, 38, now stand accused of 12 counts of "misapplication of funds from a federally insured bank."

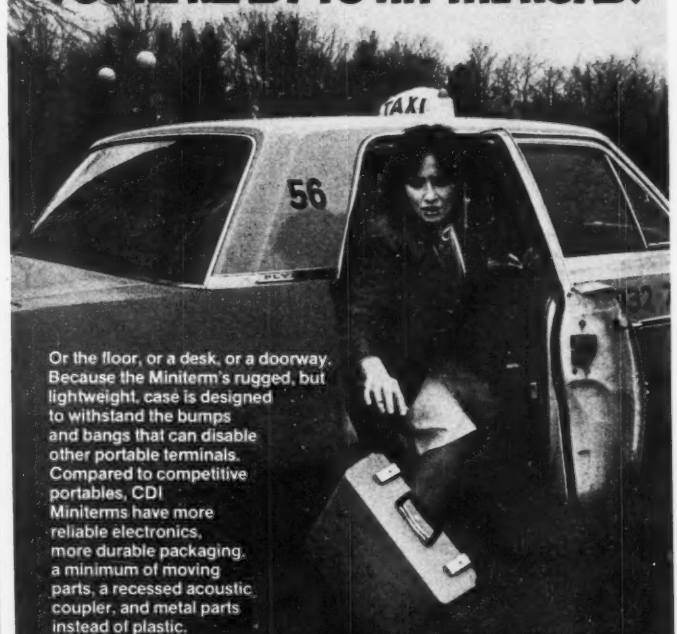
If convicted, the two face possible sentences of five years' imprisonment and/or a \$5,000 fine for each of the 12 counts, according to the spokesman.

Kelley and Warren are presently in Florida, where they were arrested, awaiting removal to Los Angeles. After their return to Los Angeles, a date will be set for their arraignment.



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To Prosecute Computer Crime Lawyer Urges Partnership of Attorneys, DPers

By Jeffry Beeler

CW West Coast Bureau

NEW YORK — Computing professionals must play a crucial role in helping attorneys prosecute DP criminals, a lawyer asserted at the recent National Computer Conference here.

"No lawyer, no matter how skillful, can lay an intelligent foundation or verify the credibility of a computer printout by himself," noted Nathaniel Kossack, a partner in the Washington, D.C., law firm of Perito, Duerk and Carlson.

Because computing remains a highly technical specialty, prosecutors need the help of knowledgeable DPers both in preparing for and presenting computer crime cases, Kossack said.

Kossack spoke at an NCC session exploring the difficulties of bringing DP criminals to trial. Other speakers during the session included Mark Richard, the U.S. Justice Department's deputy assistant attorney general, and Greg Phillips, director of the National District Attorneys' evidence tracking project in Chicago.

Kossack told a mixed audience of lawyers and users that the computing field could ease the task of prosecuting DP criminals by setting and enforcing high professional standards for its members. If more DPers could demonstrate their professional know-how and qualifications, they would command increased courtroom respect when asked to advise and testify in computer crime cases.

Distrust Prevalent

Unfortunately for prosecutors, many courts now distrust the computing field because much of the evidence its representatives have presented in the past has proven so unintelligible that judges often suspected the data of having been deliberately muddled, Kossack said.

Courts also distrust computing equipment itself because of its inaccessibility to laypersons and because of its popular reputation for making errors. "For a large part of the legal profession, a computer is viewed as the jolly gray giant," Kossack said.

As a result, courts hold the computing field to unusually high standards of trustworthiness.

In other remarks, Kossack urged lawyers in his audience to meet computer professionals and make friends with them. Although prosecutors of DP criminals must gain a working knowl-

edge of what makes up a computer system and how it works, no one can reasonably expect an attorney to rival

ments. Prosecutors, he noted, have become heavily reliant on victims and computing industry specialists when

'For a large part of the legal profession, a computer is viewed as the jolly gray giant.'

Nathaniel Kossack

the expertise of a programmer, auditor and even a technician, he said.

For this reason, "lawyers must have computer specialists by their sides at all times" when involved in DP crime litigation, Kossack explained.

Richard echoed Kossack's senti-

menting computer criminals.

"In such cases, prosecutors don't know what evidence to seize, how to seize it or what to do with it once they have it," he said. Thus, much of the responsibility for analyzing the evidence in a DP theft or fraud trial must lie

with computer professionals.

In the future, he predicted, courts and law enforcement agencies will probably have to adopt strict measures to protect computer crime evidence from tampering or destruction. One of the most likely safeguards would be to seal off the appropriate DP facilities and post a trained supervisor to control access to the hardware and software inside.

Of course, such a scheme presupposes that the observer has enough expertise to distinguish between authorized and unauthorized computer room activities, and "I realize that's sometimes wishful thinking," Richard admitted.

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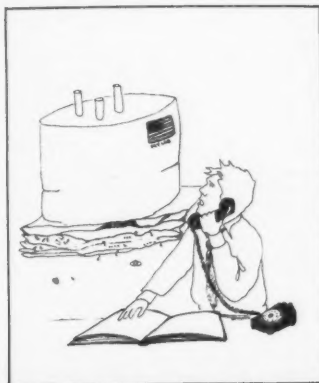
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'But Boss, I Did Check the Recovery Manual.'

Minnesota Breaks Ground With DP Literacy Test

By John C. Whitmarsh

CW Staff

NEW YORK — The nation's first comprehensive test of computer literacy among secondary students is over, and the scores suggest that both students and teachers need to bone up on computers.

Under a two-year grant from the National Science Foundation (NSF), the Minnesota Educational Computing Consortium (Mecc) tested 1,300 students in grades seven through 12 around the state.

Called a "litmus test" by some observers, the Minnesota study is believed to be the

most extensive effort of its kind to date.

The goal of the study was to probe the level of students' knowledge about computers and to learn how computer courses could expand that knowledge, perhaps easing the transition between high school and an increasingly computerized society.

Preliminary results of the study were presented to attendees of the recent National Computer Conference here by Dr. Daniel Klassen, director of special projects at Mecc. Final reports will be published from September through December,

Klassen said.

Klassen devised a computer literacy test consisting of 49 questions in the following computer-related areas: hardware; programming and algorithms; software and data processing; applications; and impact of computers.

The test was given to 1,300 secondary school students in September 1978 at the start of the school semester, before any computer courses might have begun. The same test was given to 1,300 students in January at the end of the semester and after some sort of computer course had been taken.

Satisfactory Results?

The results showed that in four of the five computer-related areas, students answered approximately half the questions correctly. In the programming category, however, students answered only 7% of the questions correctly, revealing programming to be the computer-related area students least understand.

In the preinstruction test, students answered 50% of the questions correctly, whereas 68% of the questions were answered correctly in the postinstruction test.

Is 18% a satisfactory increase? Klassen doesn't know. "We have no standards against which to judge our results," he said. "Part of our objective was to establish base values for future research, and that we have done."

The Minnesota computer literacy experiment was the result of a growing concern about the level of national understanding of computers from the U.S. Congress down to local parent/teacher associations, Klassen explained.

In addition to testing students, Mecc queried all public school teachers in grades seven through 12 for their opinions on computer education.

The consortium asked three questions. First, should secondary school students have a minimal knowledge of computers? Second, should students be able to write a computer program? Third, should students learn about the role of computers in society?

The results, Klassen said, showed strong support among teachers for computer courses in secondary school but mixed support for the idea that students ought to learn to program a computer.

A statewide survey conducted by The Minnesota Poll found that state residents asked the same three questions favored computer education in high schools even more strongly than the teachers did, Klassen said.

Part of that response may have something to do with the

extent of computer education in Minnesota. Seventy-five percent of the state school districts (responsible for 90% of the students) have access to a computer.

Challenges at College Level

Courses on computers and society may be well received at the secondary school level, but such courses face major hurdles at the college level, according to Dr. Paul Armer of the Charles Babbage Institute in Palo Alto, Calif.

A former college professor, Armer acknowledged that courses on computers and society are forming the basis of a subdiscipline within computer science programs, but their continued existence faces two challenges.

"A course on computers and society is more than just computer science," Armer said. "Such courses are multidisciplinary, involving law, psychology and other behavioral sciences."

"The problem is that the academic world is inhospitable to

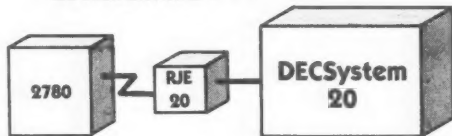
multidisciplinary subjects," Armer charged. The result, he said, is that college professors are pushed to concentrate on "pure" subject areas instead.

Several professors of his acquaintance may not get tenure at their universities if they continue to teach multidisciplinary subjects such as computers and society, Armer said. "Because the academic environment discourages anything multidisciplinary, some computer and society courses may die," Armer predicted.

A second question is whether computer and society courses should be electives or required courses.

Armer answered his own question indirectly, saying that in his experience, computer science students who have the opportunity to take such a course simply don't. "Computer science majors are just not interested in computer and society courses, and I suspect that says a lot about the introverted people who enter computer science," Armer said.

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CW6189

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System Expandability	DP, WP, TP	DP, TP	DP, TP	DP, WP, TP
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DP92/CW6189

EDITORIAL

What Do You Want at NCC?

A National Computer Conference that drew a crowd of nearly 80,000 — the final tally was 78,843 — has to be considered a great success. The largest crowd ever to attend an NCC in the past numbered 57,240, and that was in Anaheim last year.

A slow, laborious trip through the teeming Coliseum indicated most attendees were there to see new equipment rather than beef up their expertise or awareness at the technical sessions. The individuals who probably gave up many winter weekends to work on papers which they delivered to virtually empty rooms must have been sorely disappointed.

It's not clear why the sessions didn't draw the crowds. At first blush, the topics seemed germane.

Perhaps the physical layout of the conference was too spread out. After all, it was about a seven-block walk from the Coliseum — the major exhibit site — to the Hilton Hotel and the Sheraton Centre, where the technical sessions were presented.

Perhaps there were just too many technical sessions that were broken down into overly specialized subject areas.

Perhaps the papers were too academic and not really meaningful to the DP manager once he sat down. Some sessions that started out with a hundred dwindled to 10.

Whatever the reason — this year's technical program just didn't make it, and next year's conference planners should take note. Maybe it's time to recruit some new faces and fresh ideas for the program committee.

Maybe business DPs should take some interest in the program and give some time to participating, rather than leaving all the planning to our friends in academia — probably the only people whose schedules permit them the time to participate fully in such activities.

Here's your chance. How about sending some ideas to NCC's sponsor, the American Federation of Information Processing Societies, or *Computerworld*, describing what you really want to hear. Maybe next year conference attendees will find something really meaningful.

DATA PAST

Five Years Ago
June 19, 1974

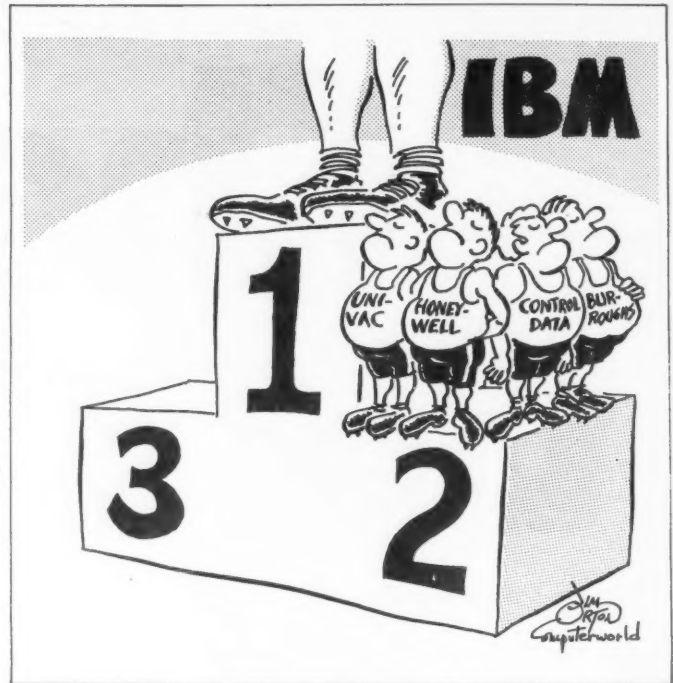
WASHINGTON, D.C. — A report on computer performance evaluation tools and techniques prepared for Congress by the General Accounting Office recommended that users be provided with comprehensive manufacturer-prepared guides to aid them in obtaining increased efficiency from their systems.

PITTSBURGH, Pa. — After deciding that it had "just too much computer power" spread out in plants where it could not be used effectively, Jones & Laughlin Steel Corp. (J&L) began a process of consolidating equipment within its plants, eliminating some DP centers and combining others in the Pittsburgh area into a single corporate computer center, according to James Mages, director of management information systems for the firm. By turning to larger computers, using terminals and improving its own mail service, J&L eliminated nine computer centers and cut its total number of mainframes from 25 to 14.

Eight Years Ago
June 23, 1971

WASHINGTON, D.C. — Warning that "the overwhelming power of the federal government to expose must be held in check," U.S. District Court Judge Gerhard A. Gesell ruled that the Federal Bureau of Investigation must stop distributing arrest records from its files outside the government except for law enforcement purposes. The practice of disseminating the files to employers, banks and others could limit an individual's freedom and could be construed as a violation of a person's right to privacy, according to Gesell.

BOSTON — Nearly half of Massachusetts' \$2 billion budget is spent on public welfare, and a team of computer experts has blamed poor management of DP resources for much of the cost runaway. The team, made up of unemployed technicians, was asked to conduct a four-week study of the Welfare Department's computer usage and presented its findings to the state's House of Representatives.



LETTERS

Improving Documentation

With regard to Joe Rigo's article on technical writing [CW, May 28], it has been my experience that the most common weaknesses in the various manuals I've read are:

1. Terms used are not explicitly defined, and different terms may be used to identify the same subject, with no indication that the terms are used as synonyms.

2. Material is presented in a sequence that is inconsistent with any logical approach to the learning process.

3. Information is presented without any explanation of its significance and/or any explanation of the result of following the described procedure.

4. Indexes are incomplete.

Therefore, I would like to propose a somewhat different approach from Rigo's, although unfortunately a more costly one that would probably be suitable only for larger organizations:

First, the documentation team would consist of a minimum of three persons — the technical specialist, a writer who would be well-grounded and experienced in teaching (with particular emphasis on skills in developing course outlines) and a representative of the group for whom the manual is intended. (I'll call him the student.) This person should have the typical level of experience expected of the user group but should have no special knowledge of the subject to be presented.

The process would be an interactive one with the teacher acting as director. The teacher would interview the technician, get a product overview and then prepare a general outline of the proposed manual. This would then be reviewed with the student.

The resulting questions would then be reviewed with the technician and the outline revised accordingly.

When the manual was complete, the team would review and identify subjects to be included in the index.

Admittedly this approach would be expensive, but when I think of all the hours I've wasted because of bad documentation, I can imagine the waste in the entire DP community. In fact, I've reached the conclusion that I'd rather have a poor system with good documentation than vice-versa; at least I can make repairs to the poor system.

Sydney B. Self Jr.

Sudbury, Mass.

Classifying Minis

I was amazed to see in CW's report on testimony in the Transamerica Computer Co. vs. IBM trial [CW, May 28] that Patrick McGovern stated that minicomputers are all classified as dedicated application computers, not as general-purpose computers.

National CSS, Inc., for example, is running essentially the same very general operating system on its 3200 mini as on the IBM 3033 and the Amdahl Corp. 470V/6, and any number of other general-purpose operating systems (usually even time-sharing systems) are available on all kinds of minis. The very fact that one can use a mini for any dedicated application makes it a general-purpose computer!

Bernard A. Galler

Ann Arbor, Mich.

Chauvinism Showdown

Robert Glass's article "Women vs. Chauvinism: A DP Showdown" [CW, June 4] was inspiring.

Women who softly render their stand as Marlene Fleiss did effectively make males as well as females aware of the chauvinism that still blatantly exists.

I've always believed every woman has the potential to liberate herself quietly, not by joining a feminist group or marching and burning bras, but by standing up to be counted when the opportunity arises.

Carol Cooke

Chelmsford, Mass.

HUMAN CONNECTION

Jack Stone

Attitudes, Not Methods, Key to Productivity Gains

For the crowd of intelligent, creative people that we DPers feel we are, too often we really delude ourselves into believing that we have derived the "ultimate answer" — sometimes referred to as the "final resolution" or the "total conclusion" — to our current problem, without taking account of perhaps the most crucial factor of all — the attitudes and viewpoints of the humans involved in the issue.

Take the subject of programmer "productivity." Every red-blooded, patriotic DP manager spends a very large and agonizing part of his thinking hours trying to figure out fancier ways to cajole, browbeat and even trounce the programming staff into pushing ever-increasing quantities of debugged code into the systems library.

So a few years back, a well-known guru noted that by approaching program development in a logical way — rather than in the ragtag, klutzy manner that most of us so enjoy — programs would arrive at the load scene with fewer bugs, run lickety-split, interface amicably and be maintainable by the village idiot.

So voila! Enter the structured programming "solution" and its many relatives, collectively called by one high-fashion vendor "improved productivity techniques" or, to gain your attention, IPT.

IPT is great, IPT is 4.0, IPT is cool. But IPT is no more and no less than a bunch of methods and procedures that work only when and if they are understood by, adapted for, applied to and

institutionalized within the systems/-programming organization.

Well, all this is nice, except that if IPT is simply announced and legislated into being — and I daresay this strategy was employed in the majority of installations that fooled around with it — most programmers will tend to reject this wonderful new way of programming life because, among other reasons, they will pick up a strong implied allegation of nonperformance in the past.

Much to Learn

We DPers have an awful lot to learn about building the productivity of our staffs. Specifically, we have to clear and reset our past notions and accept the idea that *substantial* gains in productivity are achievable not from a couple of glorious new procedures but from the *desire* of employees to work harder and produce more.

As you may know, the subject of productivity has become a national issue. The average rate of increase of U.S. productivity is deemed by the experts to be insufficient to maintain our competitive marketing posture in the world markets, one of which is the burgeoning computer systems market.

Joel Kotkin said in his June 2 *Washington Post* article that we are lagging so far behind the Japanese, for example, that several major large American corporations are starting to copy Japanese management methods! Some of the things he wrote directly apply to the situation in the computer center (I

READER COMMENTARY/Larry Singer

Quality Control Analyst: Next Development in DP?

The next advance in data processing may be just around the corner. No, it is not a faster-than-laser printing that prints a box of paper at a time instead of a page, or an operating system that gives the operator an electric shock if he tries to mount the wrong tape, or a crystal ball that tells the analyst what the user really wants.

The next major advance in DP may be applying the principle of quality control.

The manufacturing industry learned long ago that because of the complexity and speed of the assembly line, it was necessary to develop a separate quality control department that reported directly to management and functioned as a "quality assurance group." Its role was to assure management that the output of the company was complete, timely and up to accepted standards. The line managers themselves were not given this direct responsibility, since they were too involved with running their own departments.

In certain respects, a DP department is similar to a small but busy manufacturing plant. The DP section produces output in the form of listings and reports which should be vital to the operation of the company. If the output is incorrect or late, the profitability and success of the company may be affected.

Traditionally, company management has relied upon DP management to monitor the quality of the output from DP, but in many large companies the DP aspect has become so complex that DP management cannot possibly be expected to continually and faithfully monitor the quality of production.

Such a large DP section may need its own full-time quality control

(Continued on Page 30)

have provided the emphasis mark):

What is very important is relative rise of productivity: "...Since the early 1960s, according to the Labor Department studies, Japanese workers have increased their output by better than

three times the annual rate for American workers..."

While swallowing quite a bit of pride, American managers are nevertheless getting very serious about incorporating

(Continued on Page 28)

THE TAYLOR REPORT/Alan Taylor

Mass. Town Has Become Computing Capital

Is Framingham, Mass., the unchallenged center of world computerdom?

The visitor to this largest town in Middlesex County would simply notice the twin spires of the old First Parish and Plymouth churches. South of him, between the trees on Normal Hill, he would see the modern successor to the first teacher's training school in the U.S. and might reasonably think that education was the mainstay of the town. Or, he might think it was just the biggest shopping center between the cities of Boston and Worcester.

But if instead of looking up to the spires, he climbed them and surveyed the area 20 miles to the east, west and north, the visitor would see many computer plants in both the town and the surrounding county of Middlesex.

The "computerization" of Framingham started in the late '50s with the establishment of Digital Equipment Corp. and Wang Laboratories, Inc. about 20 miles north; Raytheon Co. and Honeywell, Inc. 10 miles northeast; and Computer Control Co. (3Cs) right on Old Connecticut Path in town.

Later spinoffs from DEC and Framingham's 3Cs arrived: Data General Corp. to the west in the next township some eight miles from the Centre Green; and Framingham's Prime Com-

puters, Inc., shielded only by some trees and a lake from the visitor's view as he crosses the common.

Eight miles to the northwest, RCA moved into Marlborough in force, but the '70s saw that RCA vision replaced by the DEC flag, celebrating the success of the DEC 10 business computers as well as that of the PDP line, which made minis recognized worldwide in their own right.

Honeywell, at one time spreading right into town and taking the 3Cs by corporate money, had once looked like it was destined to form a Framingham computer park second to none in the country, but that dream also faded and the DG flag now flies over the old 3Cs buildings. The Honeywell influence, still strong but not dominating, now comes from the headquarters in Waltham and Wellesley, 10 miles east of town.

This is an impressive roll call of computer manufacturers, unequalled anywhere else.

Seed Financing

At least one reason for the concentration in this area was the availability in the '50s of seed money from local DP geniuses. This money was both made here in the computer era and then spent here.

The major original sources of funds were various rewards earned by the MIT students around Jay Forrester's labs when core memory was developed there — and particularly those earned by Kenneth Olsen and An Wang.

Olsen and Wang have stayed the fi-

In next week's Taylor Report, readers suggest a five-point program to cope with deceptive DP school advertising.

nancial as well as technical leaders of their firms as they have grown... and grown... and grown.

More funds were brought into the locality by the growth of these original firms, particularly DEC. These profits seeded the first Framingham company, 3Cs. Eventually, spinoffs made Framingham the favored contender for the Prime Computer, Inc. headquarters, because of the availability here, and nowhere else, of people with the 3Cs and Honeywell product skills.

The skilled, successful people were not leaving the area just because of changes of employers; the quality of life was too good to miss. So Prime grew up around them, right in Framingham Industrial Park. Now, it

is building in just about every local town, just to keep up with the demand for its central sites here.

The town's smallness (less than 100,000 population) and its transportation convenience are also points in its favor. There is space for growth and the town is near major road and air connections.

These factors played a role in CW Communications' decision to move the headquarters of its worldwide publications (including *Computerworld* itself) right into Framingham in the next few months.

Former Titleholder

Framingham's "title" was once held by Philadelphia. The Moore School was once ahead of MIT so far as commercial computers were concerned. With Univac at the center and RCA, Philco, Honeywell, Burroughs Corp. and General Electric Co. all maintaining computer facilities in the area (although spread into other states, rather than being concentrated in a single county as happens around Framingham), everything seemed in its favor.

But the '60s saw the dream fade, and the move of RCA's computer headquarters to Framingham's doorstep signaled the demise of the Philadelphia

(Continued on Page 30)

READER COMMENTARY/George Eggert

DPMA Alive, Exciting as Influence Grows

I must react to a throw-away comment about the Data Processing Management Association (DPMA) made in "Computer Societies Ready to Take New Course" [CW, May 14].

After attempting to unravel the purpose of the article, I was left with the fear that the confused reader may really believe DPMA is akin to a bucket of wet card chips. Allow me to throw water on such a leaky statement.

The association is both healthy and growing. And, more important, it is both alive and exciting. I believe that any fair-minded person can observe that the importance and prestige of a group of information processing executives geometrically enlarges as the

role of information within the business organization grows in importance.

The more than 24,000 regular members and 4,000 student members of DPMA should not be so simply maligned.

Their role is more crucial today as top executive management works with design, analysis and operations of new and important corporate information programs. Aggressive, intelligent business people are responsible for a company's DP function, and DPMA members are in the forefront of this evaluation of good sense.

Not wanting to comment on the in-

trigues and politics of other associations, I can say the DPMA is intimately tied to the strength of its individual members on a local level. Much of the education and excitement that is DPMA happens within a closely involved group of professionals formed into a city-based chapter. This grassroots foundation means that activities and programs need not be diluted, but are planned and appreciated by local people, many sharing common concerns.

Proud of who they are and what they are accomplishing on the local level, DPMA chapter members were unfairly described in the opinion piece.

Complementing the strength and diversity of chapter-level activities, the association provides activities, seminars and programs on both a regional and international basis. Let me tick off some specific thoughts:

- DPMA represents the information processing and DP manager. It is the only DP management group to reflect the concerns of these people to business, government and equipment vendors.

- DPMA has a long and rich history of up-front involvement in such sensitive issues as "professional ethics," privacy, certification and federal job descriptions. Following association-wide debate and picking issues that realistically apply to the association's members and goals, DPMA has officially published numerous position statements and policies.

- It developed the certificate in data processing, wrote a code of ethics understood and appreciated by members, has been an educating force from the mid-1960s in the issue of privacy and recently criticized proposed inappropriate federal EDP job standards.

- DPMA has successfully fought the unfair taxing of software products in several states and has just recently filed an "amicus" in the State of Tennessee.

- DPMA has gained esteem throughout the business DP community for the consistently high caliber of educational presentations at its annual international conference.

- DPMA publications include popular books, booklets and magazines on subjects from management to hardware selection. In addition, *Data Management* magazine is a monthly providing nearly 35,000 paid subscribers with usable technology and management information without benefit of an international staff and never-ending capital funds. Topics are chosen with care.

- The association has "gone on the offensive" in preparing its members and all end users for tomorrow's confluence of technologies, as cost-effective systems mean a blending of DP, word processing, telecommunications, micrographs and other technologies.

- To aid the busy information executive, many of DPMA's recent educational programs are available in videocassette and workbook/cassette format. Some of these are being provided free to chapters.

- DPMA, through its Washington, D.C., office and Ottawa, Canada, office, is affecting formation of North American legislation standards and regulations as they affect the industry and members.

The association is gaining a positive reputation as government employees and elected officials learn that DPMA does not have a "company" axe to grind, but represents a diverse cross section of managerial people, experts without any special interests.

I could go on for hours, but I know the point is well made.

Nearly 28,000 members of DPMA know their association is a forward-looking, beneficial group of people. Eggert is international president of DPMA.

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Quality Control Analysts Ahead for DP Shops?

(Continued from Page 25)
analyst. It would be his responsibility to assure DP management that the final output of the computer room, from sales reports to payroll checks, is correct and on time. This role would be larger than the traditional DP auditor position.

To fill this important slot, DP managers should select someone on the senior programmer analyst level who has a strong technical background, is familiar with the major production systems and can interact tactfully with DP professionals at all levels. He should report directly to senior DP

management and his oral and written opinions should be respected.

Five Major Functions

A quality control analyst should have at least five major functions, the extent of which would depend primarily on the needs of the particular DP environment.

First, he should develop methods and procedures to check most reports that come out of the computer room. This would usually require cooperation with the user groups to obtain balancing information and control numbers that could be checked either manually

or automatically before the report is released.

He would design control procedures between application systems, since one common source of error is the interface between individual application systems.

If the analyst does possess a good technical background, he could design ways to catch errors as they occur in production. A transaction file that goes into a six-hour month end run may need record count or hash total balancing before the month end run. Some jobstreams may need checks to verify that Operations must execute the steps in the correct sequence.

Second, the quality control analyst should continually evaluate the efficiency of production systems, since one major aspect of the "quality" of performance of a DP section is the efficiency of its major production jobstreams.

Third, he should help evaluate new systems and major changes to existing

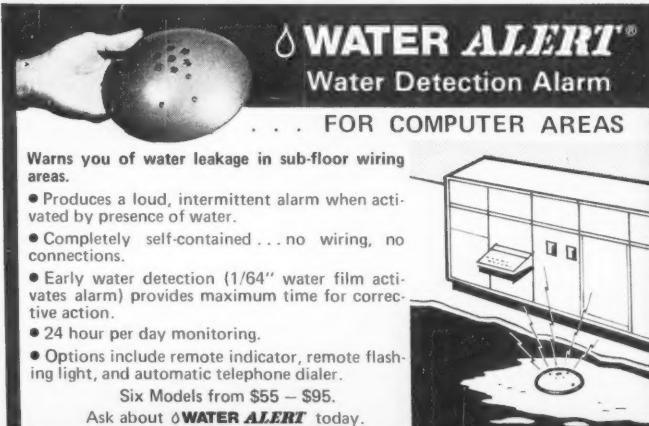
production systems. The quality control analyst should not get into specific technical details of the design of new systems, but should suggest changes that would assure the accuracy and timeliness of the new system.

Fourth, the quality control analyst is the ideal person to work with DP management in establishing programming and operational standards. Since he is not directly involved in programming, systems or operations, he can be a valuable "third party" when it comes to disputes and disagreements.

Fifth, and most important, the quality control analyst should work to promote a feeling of professional pride in all areas of DP, from programming to operations to data entry.

With the right person and positive attitude from others in the organization, the quality control analyst could become a major tool for raising the quality and professionalism of DP.

Singer is a systems analyst with Informatics in Columbus, Ohio.



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(Continued from Page 25)
area's aspirations and the acceptance of its role as originator of the royal lines of commercial computers and commercial languages. These accomplishments deserved high honors indeed, but Philadelphia is no more the modern capital of computing than Kyoto is the present capital of Japan.

Yes, the Twin City area also has several computer firms, but they are spread out from the out-of-town Control Data Corp. headquarters to the out-of-state Cray Research, Inc. In addition, their focus is on number crunching.

There is nothing like the Framingham concentration or the development of different philosophies that marks the Middlesex County area. Consider the calculator and word-processing markets of Wang, minicomputer concepts from DEC and the hardware/software of Prime.

True, firms in Silicon Valley, Calif., are very innovative, but they are smaller than those in the Twin City area.

In addition, sapphire and silicon are all very well, but only when incorporated into computers do they become gems beyond price. Otherwise, they are simply components.

The Framingham firms can put those components to work. Again, Framingham comes to the fore in the competi-

tion.

But what about contenders outside the U.S.? The outstanding foreign manufacturers are the UK's International Computers Ltd., an international giant, and the Japanese computer divisions of established electronic conglomerates. But ICL stands by itself, and the Japanese companies have not grouped themselves around some functional center, as far as I know. In addition, like the Twin City group, their computers remain traditional rather than constantly innovative.

So there you have it. Somewhere, computers have a world center; they are too important not to have one. From my analysis, Framingham appears to be the place, even though local officials have not yet fully realized it.

Even the very ability of the visitor to enjoy the traditional values of a small community can now be seen as part of the recipe for modern success. Here, computers are kept unobtrusive ancillaries to the community life. And this is what I think makes Framingham worthy of the crown it is so quietly wearing.

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Hex Searching for Rescuer

(Continued from Page 28)

forcements."

"That would take quite a while, sir, even if we drove down the Data Highway at the maximum rate. Why not leave him to us? I've got a couple of hefty lads outside on the incremental dumper."

"But he's armed. He has an ultra-violet Prom-eraser. You'll have to be careful."

"Beg your pardon, sir, but Prom-erasers don't frighten us. We're industrial robots, built for heavy duty. A Prom-eraser might be a problem for an intellectual software type like yourself, if you'll excuse me saying so, but it

doesn't worry us."

He went outside to collect his mates from the dumper.

"Okay boys," Hex heard him call outside. "Off the truck! We've got a spot of bother here with an escaped human."

A few seconds later, there was a scream from an upstairs window. Hex ran outside. The robots were climbing off the dumper. "Quick, follow me!" he called.

What happened?

Where will it all end?

Find out next week.

Forsyth is software manager for RAIR Timesharing in the UK.


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Settlement Confirms Users' Rights

By Don Leavitt
CW Staff

SAN FRANCISCO — The settlement of a lawsuit between Software Design, Inc. (SDI) and Computer Associates may set a precedent, preventing users from becoming locked into working with one software vendor against their wills.

Under the terms of the agreement, which has been filed with the federal court here, SDI conceded that the output of its Epat tape library management system is not proprietary information, the disclosure of which would constitute the breaking of an SDI trade secret. The significance of the settlement is that users of Epat are now free to provide output from that software system to Computer Associates so that it can use the output to convert users to its competing product, CA-Dynam/T.

The settlement is not limited to current users. If the output of Epat is modified at a later date, Computer Associates will be permitted to ask Epat customers to generate samples of the revised output so that Computer Associates could in turn mod-

ify its conversion program to accommodate the new output.

Output Called Trade Secret

SDI originally brought the suit against Computer Associates (and 100 "John Doe" Epat users) in May 1978 to prevent the users from switching over to CA-Dynam/T. In some cases, the only record the user had of the contents of their tape libraries was the output of Epat.

SDI had claimed that this output constituted trade secret and confidential information belonging to SDI and that Epat customers did not have the right to use such information freely for their business purposes. Computer Associates opposed those positions.

Following the settlement, SDI's general counsel — who joined the company after the suit was filed — said his review of the situation convinced him there was no "intentional wrongdoing" on either side and the trade secret claim was unwarranted. A source at Computer Associates noted that no money was involved in the settlement — "We just walked away from each other,

that's all."

Throughout the lawsuit, which had not gone to trial before the settlement, Computer Associates contended that one of the fundamental principles of the software industry was that programs must, to some degree, interact with other programs. The growth of the software industry and the widespread use of computers in business was built on the premise that the customer had the right and the ability to have his basic information processed by whatever programs he wanted and that the output belonged to the user.

If that is not the case, the spokesman noted last week, then output from any package bought from a vendor or built in-house could not be freely used with any other package. Carrying the argument to the extreme, the user's file, sorted by an acquired package, was no longer the user's information, he argued.

"One might even ask if checks generated by a payroll package or an accounts receivable system were the property of the package vendor or the user," he added.



BCS center includes an earth station for satellite communications.

BCS Builds Data Center

VIENNA, Va. — Boeing Computer Services Co. (BCS) has moved into a two-building complex here intended to serve the firm's remote computing service clients better than the leased quarters previously used.

Among the computing and communications gear — estimated at \$20 million — are a pair of IBM 3033s, each equipped with 8M bytes of main memory, and a 370/168 moved from the service firm's previous location in nearby McLean, Va. The

370/168 currently has 6M bytes of main memory, but will be upgraded to 8M bytes within 60 days, a spokesman said.

One of the 3033s is dedicated to users of BCS Mainstream Conversational Terminal Service, while the other is intended for Time Sharing Option users. The Model 168 is the backup unit. All run under both MVS and VM-1370.

BCS is headquartered at 177 Madison Ave., Morristown, N.J. 07960.

Data Dictionary Update Eases User Definitions

BEDFORD, Mass. — Release 2.0 of the Data Catalogue 2 data dictionary/directory system from Synergetics Corp. includes enhancements which individually address performance, security and integrity.

They also combine to increase the flexibility of the software and make it supportive of IBM's Hierarchical Input Processing Output (Hipo) documentation techniques as well as structured analysis methods, a spokesman claimed.

One of the major enhancements — one the spokesman called "cloning" — enables the user to define entity types to fit his own organizational needs. Added entities may include such captions as Process, Dataflow, Datastore, Job or Step to complement the existing Data Catalogue 2 entities: User, System, Program and Task, as well as Data Base, Segment, SSA and PSB, he said.

All of these are in addition to the conventional file structure entities users can define with Data Catalogue 2: Element, Group, Record, File, Report,

Form and External. The user-defined entity names can be run in any combination with the package's standard entity names, the spokesman emphasized.

Security features added in Release 2.0 allow the data administrator to assign various levels of access and system service privileges. The administrator can also assign ownership of specific entries to selected users, the spokesman said.

The dictionary/directory system now reports violations of user-defined standards, a feature which simplifies the task of monitoring the quality of data stored in the system, he added.

Supplementing backup/restore facilities in earlier releases, the package has been updated to include recovery mechanisms.

Release 2.0 runs under DOS, OS or VS and costs \$13,000 to \$30,000, depending on features selected. Support for teleprocessing and data base interfaces would move the cost toward the high end of the scale, Synergetics said from One DeAngelo Drive, Bedford, Mass. 01730.

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Because of Human Factors Studies Give Modern Techniques Mixed Ratings

By Marguerite Zientara
CW Staff

NEW YORK — Software psychology is a "living, breathing, throbbing, changing area" that can have a great impact on present programming methods, a panel agreed here recently.

Opening the well-attended National Computer Conference session entitled, "Software Psychology: Exploring the Human Factor," Tom Love, manager of advanced systems development at General Electric Co. in Rockville, Md.,

described the first-year results of a GE research program on the human factors in software engineering.

The research had two major thrusts. First, researchers investigated the effects of several modern programming practices on programmer efficiency. Secondly, they investigated the prediction of programmer performance from software complexity metrics such as those proposed by Halstead and McCabe, Love explained.

In the first experiment, pro-

grammers studied a short Fortran program for 25 minutes and then were asked to reconstruct a functionally equivalent program from memory in 20 minutes. In the second experiment, programmers were asked to implement a specific modification to a program, with no time limit, Love said.

A third experiment furnished programmers with input, correct output and erroneous output and asked programmers to find one bug in a single line. In the last experiment, results showed no relationship between a programmer's experience and his ability to find the error, Love noted. What mattered was not the length of a programmer's experience, but the diversity of it, including the number of languages the programmer knew, the researchers found.

In the first and second experiments, individual differences among programmers and the complexity of the control flow were found to influence performance. In experiment number two the difficulty of the requested modification and the order of presentation influenced both the accuracy and speed of implementing modifications. Contrary to expectations, however, mnemonic variable names and types of commenting did not influence performance in the experiments.

Programming Practices

Dr. Bill Curtis, manager of the software management research unit in the Space Division of GE in Arlington, Va., and also a psychologist, told session attendees about another project that was designed to evaluate several modern programming practices in the light of traditional practices.

Taking two programs from a missile flight control project, one, the "modern" Launch Support Data Base (LSDB) and the other, the "traditional" Data Analysis Processor (DAP), researchers compared the programming effort, length and efficiency associated with each one. The modern LSDB program was three times the size of DAP, with 16,000 lines compared with 5,000 lines for DAP, yet it only took 8,081 man-hours to program compared with 6,782 man-hours for DAP — a 119% longer time, Curtis stressed.

Researchers concluded from the study that modern programming practices are more efficient than traditional methods. Curtis noted, too, that the modern LSDB contained more comment lines than executable notes, but only because the programmers had free time and were told

there were not enough comment lines.

In addition, the experiment showed that the more regions there were in the control flow, the more complex and harder to maintain the program was. Researchers concluded, then, that the modern methods result in a higher quality code that is easier to maintain and that contains fewer system test errors.

'Embarrassing' Error Rate

Dr. John Gannon of the Computer Science Department at the University of Maryland described an experiment comparing two types of programming languages — statically types (ST) and typeless (NT) language. His experiment aimed to produce an NT from an ST, using 33 college seniors and graduate students as his subjects.

After studying an ST program of 27 to 85 statements and an NT program of 31 to 105 statements, each subject produced two solutions to a string reversal problem, Gannon said. The results showed a "terrible, embarrassing," high error rate, with 25.3 NT errors and 16.27 ST errors.

The number of runs in which errors occurred were 111.51 for NT and 42.48 for ST, Curtis indicated. The researchers concluded that while ST helps programmers detect errors quickly, it does not prevent errors. In addition, the study showed that the subjects learned something both from using the ST language and from figuring out how to solve the problem at hand.

Presenting the results of an-

other experiment was Dr. Anthony Norcio, coordinator of academic services for the computer center at Catholic University in Washington, D.C. Norcio's experiment concerned the study of factors affecting the comprehension of computer programs.

For each of five Fortran programs, each containing 11 to 33 lines, 60 novice programmers (university students) were to furnish every third line, which had been deleted. The results of the experiment showed that indentation and documentation were not that significant in affecting the outcome of the students' attempts.

When beginning lines were missing from the program, 1.29% of the subjects' answers were correct, but when lines from within the segment groups were missing, the rate of correct answers went up to 2.8%, Norcio said. Those results reflect what Norcio called "chunking" — that is, the grouping of information in the mind so that, for example, if the first word in a list is recalled, the rest of the list will follow.

The implications of the experiment, then, indicate that a clear delineation of logic segments, indentation and explanation aid a programmer in understanding the logic of a program.

In wrapping up the session, moderator Ben Shneiderman, an associate professor at the University of Maryland, expressed the hope that interest will grow in the area of software psychology.

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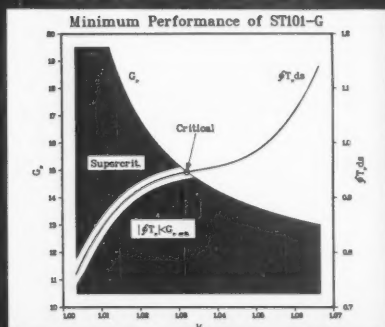
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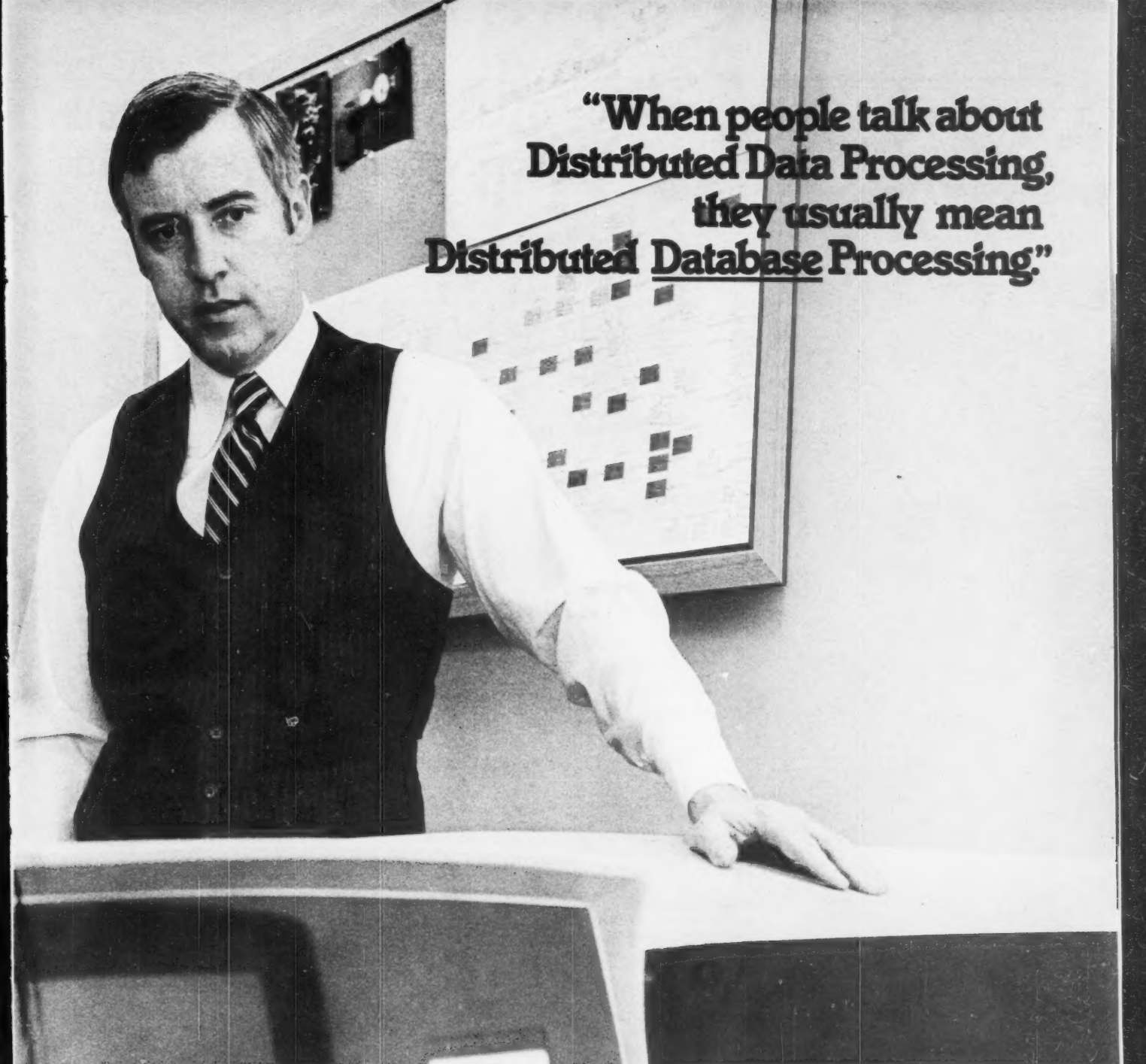
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With the availability of low-cost, high-performance hardware like the IBM 4300, more and more organizations are including distributed database networks in their future plans.

That future is here *today* with Cullinane Corporation. Cullinane pioneered in distributed database technology when we designed and implemented a prototype back-end database system for four government agencies. What we learned from this project about the unique requirements of distributed database technology led directly to the architecture of Release 5.0 of IDMS, IDMS-DC, our new powerful teleprocessing monitor, and Multiple

Computer Support (MCS), a system that allows multiple IBM-compatible CPUs to share databases.

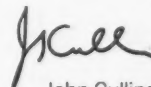
These three products—IDMS 5.0, IDMS-DC and MCS—allow applications programs to reside at remote sites and to update a central control database with user transparency and database integrity. Distributed database systems allow upper management to consolidate information from remote databases into a central database. This is possible through the separation of the application program from the DBMS—a capability which is unique to IDMS and essential to the implementation of distributed database systems.

Distributed database is only one example of Cullinane leadership in the development of management software designed to protect today's investment while providing

tools for the future. For example, we will be offering an interface which will allow IDMS to support DL/I applications. Another new product, the Automatic Applications Development System (AADS), will enable users to develop applications rapidly by defining a few simple parameters as opposed to performing complex coding tasks.

Before you make a database decision affecting your ability to manage your organization tomorrow, look at Cullinane today.

Write or call for more information on our special management briefing session or on our advanced database software products.



John Cullinane, President

Cullinane Corporation



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Independent's Compiler Puts Dibol on PDP-11

SACRAMENTO, Calif. — Although Digital Equipment Corp. supports Dibol programming only on its Datasystem CTS-300 and CTS-500 configurations, a small software house here has introduced a software package that it said makes Dibol available to any PDP-11 or PDP-11-compatible minicomputer.

The DBL-11 compiler and runtime system from Digital Information Systems Corp. (Disc) enables users to run Dibol-11 applications under both the RT-11 and RSTS/E operating systems. DBL-11 will be available in September for use under RSX-11, a spokesman stated.

Small, conventional PDP-11s are usually less expensive than the Datasystem configurations that are in fact, built from PDP-11s, he said, explaining why DBL-11 should be considered a useful product. The logic of the runtime system from Disc also reduces the disk space by approximately 40%, he added.

DBL-11 has been implemented in a single-user version for \$1,100.

A version of DBL-11 for the DEC-compatible Plessey Peripheral Systems, Inc. Micro-1 is available directly from Plessey, the spokesman added from Disc at Suite 125, 2550 Fair Oaks Blvd., Sacramento, Calif. 95825.

Codasyl-Based DBMS Built For Network-Type Systems

W. LAFAYETTE, Ind. — DSS-1, a data base management system (DBMS) that is written in Fortran IV for portability, generally complies with Codasyl specifications but includes extensions which are particularly useful to network-type data base systems, according to its vendor, Decision Support Systems, Inc. (DSS).

The system provides commands that alter schemata dynamically, thus simplifying the restructuring of data to fit the changing needs of the using organization. Record types can be added or deleted; data items can be added or removed from existing record types; and set types can be established or dropped from a schema, a spokesman reported.

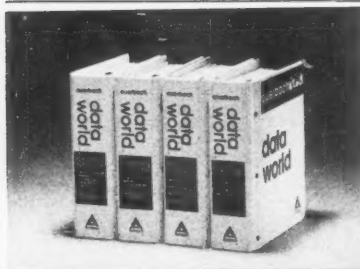
Codasyl's DBMS specifications limit data structures to those normally described as one-to-many relationships, through which one "owner" record can help locate a number of related "member" records. DSS-1 goes beyond that, however, and also supports many-to-many relationships (often called network structures) in a "symmetric" manner.

Commands such Find Next Member and Find Member (based on a sort key) have equivalent commands to process the multiple "owners" of a record. This allows indexing applications — such as support for bibliographies or other cross-referencing systems — to use unambiguous and easily interpreted data structures. That, in turn, simplifies the programming, DSS asserted.

Dynamic storage management and a variety of command options are included in the package.

DSS-1 was designed for use with Fortran as the host language for application programs, but a Cobol preprocessor is also available. The system has been implemented on equipment from such diverse sources as Control Data Corp., Digital Equipment Corp., IBM, NCR Corp. and Univac.

The DSS-1 package, consisting of a data management system and a data definition language analyzer, costs \$7,000 from DSS, P.O. Box 2069, W. Lafayette, Ind. 47906.

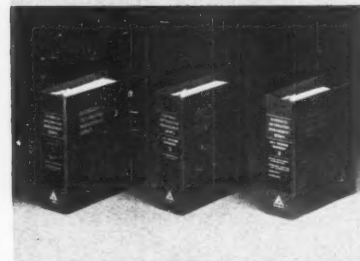


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Cobol Routine Validates Dates

NEW YORK — Dum Date, a Cobol subroutine that validates date fields and converts them from one format to another under program control, is now available from the Dum Dum Routines Division of MSL Computer Associates, Inc.

The validation facility is essentially a by-product of the conversion procedure, a spokesman noted. If a user enters an illogical date — June 31, for example — as input to the converter, the system will recognize and reject the flawed data with an error message.

Triggered by a CALL from Fortran, Cobol, PL/I or any other language with the Call facility, Dum Date is said to be capable of handling date conversion "to and from thousands of formats." These include most of the common requirements — all-numeric MMDDYY to an alpha month (full or abbreviated) numeric date, comma and four-digit year, for instance, or Julian to Gregorian or vice versa.

The package also includes the capability to calculate how many days have elapsed between a base date (Dec. 31, 1599) and any user-specified date.

Such a calculation is easy if both dates are in the same year; simple subtraction of Julian dates would yield the answer. But Dum Date enables users to make that kind of calculation across year-end boundaries and without worrying about leap years or what happens at century changes.

Requiring less than 10K bytes of memory and a system architecture that supports 4-byte integers, Dum Date costs \$500. Dum Dum Routines is at Suite 717, 370 Seventh Ave., New York, N.Y. 10001.

*The ruins of Macchu Picchu, Peru,
from an empire built between 1200 and 1530 A.D.*

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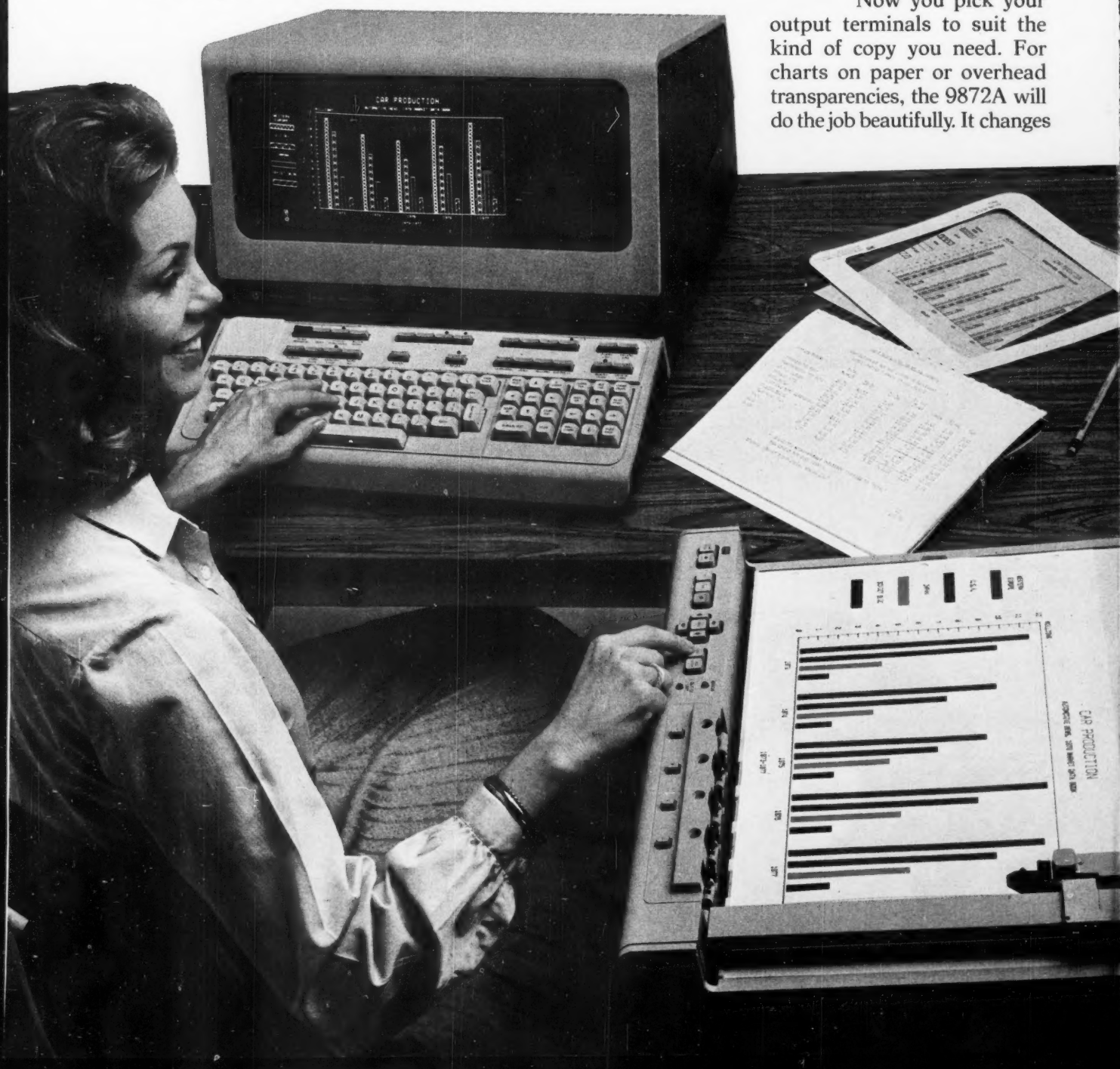
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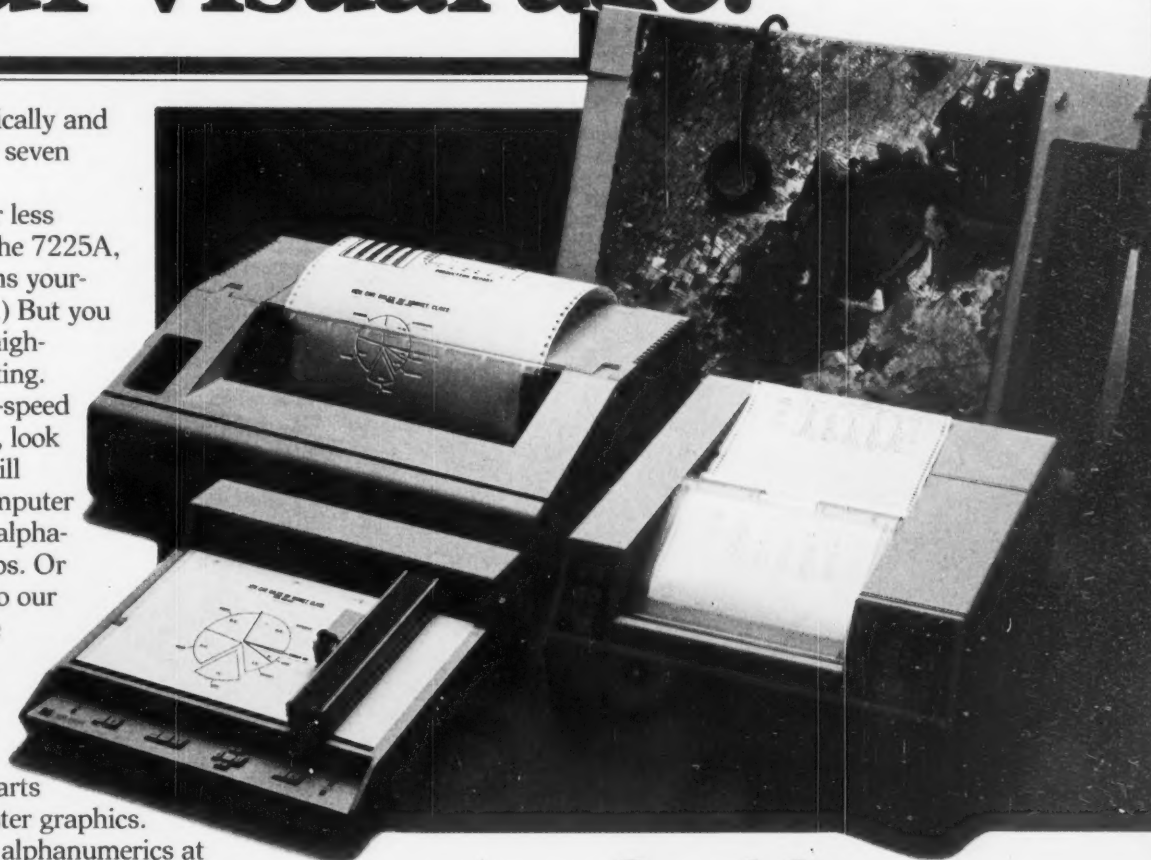
four pens automatically and will give you up to seven different colors.

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351

'Vividata' Turns 360, 370 Data Into Graphics

ST. LOUIS — Users working on IBM 360s or 370s under OS/MVT or MVS with TSO now have the capability of creating bar charts, graphs and pie charts from computer-processed data with the Vividata package from McDonnell-Douglas Automation Co. (McAuto).

The package is a library of subroutines and functions which, when called into users' application programs, convert

tabular data into graphic form on CRT graphics terminals or on on-line or off-line plotters, a spokesman said. Vividata thus appears to be in the same class of software as Disspla and Tell-a-Graf from San Diego-based Integrated Software Systems Co.

Vividata produces color graphics on the Tektronix, Inc. 4027 and Ramtek Corp. 6200A terminals and the standard green trace on many of

the Tektronix 4000 series terminals, as well as the Hughes Conographic and Megraphic 5014 units.

Off-line plotting is handled through Vividata's postprocessors, which create tapes to drive electrostatic or pen-and-ink plotters. On-line plotting is provided by the Tektronix 4662.

Vividata can be licensed for \$25,000. This covers the current software and maintenance

and library updates for a year. Continuing support after that costs \$2,400 annually. Monthly rental plans are also

available, the spokesman said.

McAuto can be reached through P.O. Box 516, St. Louis, Mo. 63166.

Summer Workshop Slated For Teachers of Statistics

DURHAM, N.H. — A workshop on "The Use of Computers in Teaching Statistics" will be held at the University

of New Hampshire (UNH) campus here on Aug. 7-8. Emphasis will be on the use of "modest" computing resources.

Among the programs available will be Ida; Minitab; a variety of programs from Conduit; Rosepack and Explor — which the university describes as "robust methods for exploratory analysis"; and Stics, a system for generating statistics exams.

Although much of the agenda has been established, anyone wishing to put on a 30-minute presentation of computer-based materials for teaching statistics is invited to submit a proposal.

More information about the conference is available from the Office of Academic Computing, UNH, 304 McConnell Hall, Durham, N.H. 03824.

Package Backs Spectra Work

ENGLEWOOD CLIFFS, N.J. — Scientists and technicians doing spectra resolutions work can get help from a transmission calculation package available from Resource Software International, Inc. (RSI) for use on a Hewlett-Packard Co. minicomputer.

The package calculates percent transmissions for single beam spectrometers.

Written in Basic, the package costs \$150, the company said from 140 Sylvan Ave., Englewood Cliffs, N.J. 07632.

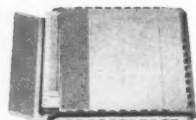


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Three Modems Also Added SNA Upgraded to Handle More Links

WHITE PLAINS, N.Y. — IBM has announced major upgrades to its Systems Network Architecture (SNA) that reportedly allow users to establish more links between IBM mainframes and terminals.

The enhancements also improve the efficiency and reliability of data paths and place points of control "virtually anywhere" in the user's network, IBM claimed.

The vendor released three modems — the models 3863, 3864 and 3865 — which are able to monitor their own performance and that of attached communication lines and terminals under the control of enhanced SNA software, according to a spokesman. The 3863 and 3864 run at 2,400- and 4,800

For a price breakdown of the SNA enhancements announced by IBM, see box on Page 40.

bit/sec, respectively, while the Model 3865 can transmit over unconditioned lines at 9,600 bit/sec.

Complementing the self-diagnostic modems are improved features of SNA that permit a network to be programmed for the selection of alternate data paths in the event communications are interrupted. SNA can now monitor message traffic by keeping a record of errors and signaling possible problem areas to system operators for preventive maintenance, the spokesman said.

The improvements also reduce the amount of programming needed to incorporate terminals and other devices into a network, he noted. With fewer routine system design tasks to perform, programmers have more time to address end-user applications.

A wider variety of IBM and other terminals can now run IBM's Customer Information Control System/Virtual Storage (CICS/VS) under SNA software, the vendor added.

The SNA enhancements are said to be primarily supported by:

- Recent releases of IBM's Advanced Communications Function/Virtual Telecommunications Access Method (ACF/Vtam) and Telecommunications Access Method (ACF/Tcam).

- ACF/Network Control Program/Virtual Storage (ACF/NCP/VS) Release 3.

ACF/Vtam and ACF/Tcam handle communications between IBM mainframes linked in a data network, IBM explained.

Release 3 of ACF/NCP/VS operates in an IBM 3705 communications controller, joining IBM mainframes with terminals and other processors in a network.

New functions reportedly offered by Release 3 operating with ACF/Vtam/VS or ACF/Tcam Version 2 Release 3 include:

- Multiple data paths between each CPU and parallel links between 3705 controllers to improve transmission speed and reliability.

- Multiple logical transmission groups that allow user selection of separate data

(Continued on Page 40)

Rolm Aims Passel of Products At 'Office of the Future' Users

SANTA CLARA, Calif. — Rolm Corp. has entered the fledgling but fast-growing "office of the future" arena with the release of an interoffice message system and other products.

The Rolm Electronic Message System (Rems) allows users to send, process, store and deliver office memos via the office telephone system, the company said. Designed for office communications where immediate feedback is not required, Rems works by connecting CRT and hard-copy terminals to the message processor over standard office phone lines or from remote offices through modems.

"The system is ideal for the short, five- to 10-line memos that are so profuse in every office," a spokesman said.

Also introduced were six software packages that permit the Rolm computerized business telephone systems (CBX) redundant CPU to be used as an applications processor.

Users send and receive messages by plugging a CRT, a printer terminal or both into the Rolm ETS 100 digital electronic telephone. During the transmission of messages, the phone can still be used for normal conversations.

By entering a password, each Rems user can gain access to messages. The messages are called out of the computer and displayed on the CRT or printed out.

The primary computer in the redundant system controls the phone system, leaving the second CPU to handle message switching. If one system fails, the other can handle both jobs, the company noted.

Existing Rolm CBX systems can be updated for Rems capability if they include a second processor. Converting to the Rems requires the purchase of additional terminals, a floppy disk system and an ETS 100 tele-

phone to access the computer.

Rolm declined to give any prices for this or any of the products it introduced, explaining that prices are set by the firm's distributors. The spokesman added that if the company were to release a price that was low, "it would embarrass some distributors"; if the price were too high, it might encourage distributors to ask that much for it.

Since the products would only be of use to a firm that already has Rolm equipment, "the price would be academic anyway," he stated.

Other Introductions

Rolm also announced the Rolm Analysis Center, CBX Management Reporter and a floppy disk system for recording details of telephone calls, all scheduled for August availability.

The Analysis Center, located at Rolm's facility in California, provides management reports for a month or less and is available to users of any computerized business telephone system. Report formats at the center include disks, 9-track tapes or tape cartridges.

Standard reports include department, division, cost center and company summaries; exception reports of cost and duration; call summary by trunk group by Wats band; trunk usage by time of day; company directory; and a data base report.

Optional reports cover extension call details; account code summaries and details; city, area code and state summaries; and called number listings, Rolm said.

Cost Allocation Software

The CBX Management Reporter is part of Rolm's recently introduced Release Six software. It can be retrofitted on installed Rolm

(Continued on Page 40)

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SNA Handles More Mainframe-Terminal Links

(Continued from Page 39)
paths for different types of messages.

• Extended NCP interconnection and control, permitting many 3705s to be interlinked and giving users more configuration options.

A recently released version of the Network Terminal Option (NTO Release 2) software extends the above functions to selected start-stop terminals such as IBM's 2740 and 2741 and other teletypewriter devices. NTO Release 2 is supported by CICS/VS, so some terminals currently supported through the Basic Telecommu-

nications Access Method (Btam) can now also be supported by ACF/Vtam, ACF/Tcam and ACF/NCP/VS, IBM noted.

Error Statistics

Finally, IBM brought out a release of the Network Problem Determination Application (NPDA) program along with Release 2.1 of ACF/NCP/VS to work together in collecting and organizing error statistics from the network, easing problem determination.

This information is displayed for a network operator who can use it and the data

supplied by the 3863, 3864 and 3865 modems to locate trouble spots in the line, modem or device.

With leased line attachments, the 3863, 3864 and 3865 cost

\$2,135, \$3,500 and \$5,300, respectively; the modems also may be leased for a two-year period at \$60, \$105 or \$165 per month, respectively, or rented for \$71, \$123 or \$194

per month.

Delivery of the first two modems is slated to begin in the first quarter of 1980. The Model 3865 will be shipped in the second quarter.

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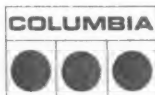
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Networking Feature	4Q	1980	600
ACF/TCAM Release 3	4Q	1980	450
Networking Feature	4Q	1980	800
ACF/NCP Release 2.1	2Q	1980	120
ACF/NCP Release 3	2Q	1981	120
NTO Release 2	1Q	1981	100
NPDA Release 2	3Q	1980	32

Program	Available with OS/VS1		Basic Monthly Charge
ACF/VTAM Release 3	2Q	1981	\$240
Networking Feature	2Q	1981	600
ACF/TCAM Release 3	1Q	1981	450
Networking Feature	1Q	1981	800
ACF/NCP Release 2.1	2Q	1980	120
ACF/NCP Release 3	2Q	1981	120
NTO Release 2	1Q	1981	100
NPDA Release 2	1Q	1981	32

Program	Available with DOS/VSE		Basic Monthly Charge
ACF/VTAM Release 3	1Q	1981	\$ 85
Networking Feature	1Q	1981	160
ACF/NCP Release 3	2Q	1981	120
ACF/NCP Release 2.1	2Q	1980	120
NTO Release 2	1Q	1981	100
NPDA Release 2	4Q	1980	32

Price Breakdown of SNA Enhancements

Rolm Introduces Product Passel

(Continued from Page 39)
CBXs, although additional memory will be required in some cases.

The reporter is used for cost allocation and integrates approximate costs of calls into the CBX computer. With it, charges can be assigned to individual departments or billed back to clients.

The system can accumulate such information as the longest calls and the 50 most costly calls. One report details 1,500 calls, selected by account code, calling extension or called number, the company explained.

The Management Reporter also accumulates hourly data for selected trunks, trunk groups, area codes, exchanges or called numbers and allows the ETS 100 to display the cost of calls in progress.

To record information for the Analysis Center and Management Reporter, Rolm's introduced a floppy disk-based call detail recording capability for its business telephone systems family. Compatible with the IBM 3740, the device utilizes a single-sided disk with a capacity approximately of 15,000 calls.

Telephone traffic information is gathered continuously by trunk group. Indicators show how many calls are made, how many are received, their duration and other data, according to the company.

For phone systems with as few as 24 extensions, Rolm announced VSCBX, a more compact and less expensive version of the company's

larger computerized telephone systems.

In addition, the firm introduced an enhanced version of its SCBX switch for organizations requiring 48 to 208 lines. The VSCBX and SCBX can be used in medical clinics, small utilities, retail and small business organizations or corporations' remote branches.

Finally, the company introduced software that permits Rolm CBX users to access and place calls on MCI Commu-

cations Corp.'s Execunet and Southern Pacific Communication Co.'s Sprint IV and Sprint V services.

The advantage of the support software is that users need only dial "9" and the desired long distance number, making it unnecessary to check serving area guides or dial authorization codes.

Rolm's Telecommunications Division is located at 4900 Old Ironsides Drive, Santa Clara, Calif. 95050.

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Hungarian Railway Plans Sophisticated Monitoring

By Ivan Berenyi
Special to CW

BUDAPEST — Hungary's state railway, MAV, intends to have a real-time, freight-car monitoring and control system operational by the end of next year, according to the director of its 700-strong computer division, Joseph Perei. Based entirely on hardware from the unified Council for Mutual Economic Assistance (Comecon) Eser range, it will be among the most sophisticated transportation applications developed in Eastern Europe.

The system, which initially will be confined to the country's 24 frontier stations, is a response to the enormous growth in freight traffic crossing Hungary in the wake of detente. MAV's planned cargo traffic volume for 1980 was surpassed in 1976 and has been growing at more than 22% each year. Half of all freight carried by rail in Hungary emanates from the West.

"The system will be a tracing and recordkeeping operation concerned with foreign wagons entering Hungary — on which we have to pay daily rentals in Swiss francs — and on MAV cars leaving the country," Perei explained. "It is essential to run a closely monitored scheduling system to optimize wagon usage and prevent wasted capacity. But at the same time, it will be a full interline accounting and clearing system vis-a-vis neighboring railway companies.

"The on-line system, which will run under the in-house Saman operating system, developed at the cost of some 60 man-years, will enable management to review figures on demand," Perei stressed.

The wagon control system will be based on MAV's duplexed 1K-byte Robotron R40 mainframes installed here at Budapest's Deli Palyaudvar Station. Communications will be over the railway's private 1,200 bit/sec data network via twin Videoton Computer, Inc. R-10 minicomputers acting as front-end processors.

"The network will be comprised of a mixture of minicomputers, intelligent terminals and teletypewriters, according to the relative importance of individual frontier stations," Perei said. "In some cases, there will be combined solutions. For instance, at Komarom and Hegyeshalom on the Czechoslovak and Austrian borders, microcomputers will be tied into the system which also will carry out medium-level administrative processing for the stations."

These micros are known as MAV-51s. Based on the Motorola Corp. 6800, they are made for the railway by the Institute for Computer Coordination in Budapest.

Intelligent terminals in the net will be VTS-56100 models made, like the R-10 minicomputers, by Hungarian manufacturer Videoton and incorporating Intel Corp. 8080 MPUs.

Bell-Type Modem Bows

FORT WASHINGTON, Pa. — A 1,200 bit/sec Bell-compatible modem that connects directly to the public switched network without the need for leasing the Bell System Data Access Arrangement (DAA) was introduced recently by the Tele-Dynamics Division of Ambac Industries, Inc.

Controller Gives Graphics Units Dial-Up Ability

CHATSWORTH, Calif. — Micom Systems, Inc. has introduced the 548 Error Controller for interactive graphics terminals, offering dial-up operations at 2,400- and 4,800 bit/sec using Bell 201B and 208B modems or their equivalent.

Most interactive graphics terminals such as the Tektronix, Inc. 4014 require a full-duplex transmission link when used remotely and are limited to leased-line operation or dial-up operation at 1,200 bit/sec or less, Micom said.

The 548 was designed primarily as a half- to full-duplex protocol converter, permitting full-duplex Teletype Corp.-compatible terminals to operate with half-duplex, dial-up modems at speeds higher than 1,200 bit/sec.

It also acts as an error controller and as an asynchronous-to-synchronous converter, permitting asynchronous terminals to operate with synchronous high-speed modems, Micom claimed.

The controller costs \$995 from the vendor at 9551 Irondale Ave., Chatsworth, Calif. 91311.

The modem, called the 7202S, provides either automatic or manual answering, operates in half-duplex mode on two-wire lines and is Bell 202S- (or CCITT V. 23-) compatible.

The 7202S has self-test and loopback capabilities, with two front-panel switches for test mode selection. Nine indicator lamps display control and data functions to simplify fault analysis, a spokesman said.

A secondary reverse channel is provided as an option. Five- and 75 bit/sec secondary channels are available that comply with CCITT R.35 for worldwide applications, the spokesman noted.

The modem can be purchased for \$465 from the Tele-Dynamics Division of Ambac Industries at 525 Virginia Drive, Fort Washington, Pa. 19034.

Hazeltine CRT Backs Small Business Users

GREENLAWN, N.Y. — A microprocessor-based CRT terminal designed to support small business systems using both data and word processing software has been introduced by Hazeltine Corp.

The Hazeltine 1420 is the third member of the 1400 series line. It operates with a standard RS-232C interface, runs at eight switch-selectable transmission rates up to 9,600 bit/sec, accommodates all 128 ASCII codes and offers a separate CRT and keyboard.

A two-year factory warranty is being offered for the first time on the three 1400 series machines.

The Model 1420 costs \$995 from Hazeltine's Computer Terminal Equipment Division, Greenlawn, N.Y. 11740.

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		(918) 492-7333 Tulsa, OK.	(514) 489-2453 Montreal, QUE.

Color CRT Enhanced

NORCROSS, Ga. — Intelligent Systems Corp. has released an upgraded version of its Intercolor 8001G color graphics terminal.

The 8001H offers high-resolution graphics and 512 software-programmable characters. Random vector and symboling resolution is 480 by 384, the vendor said.

The 8001H reportedly operates in three main modes, eight foreground and background colors, with an 8080A microprocessor and a color and numeric keyboard. RS-232C interfacing capabilities plus 2K bytes of read-only memory are standard.

The unit costs \$3,650. Intelligent Systems is located at 5965 Peachtree Corners East, Norcross, Ga. 30071.

Multiplexer Works for DG Users

PROVO, Utah — A 16-channel multiplexer to control full-duplex, asynchronous communications on independent lines has been introduced by SOS Computer Systems, Inc. The SMUX-16 will interface with Data General Corp.'s 4060 software, according to SOS.

The SMUX-16 eliminates the need for a special chassis since all voltages are supplied by the DG backplane. Users can achieve a maximum of 64 full-

duplex lines by simultaneously using four SMUX-16 boards. A secondary code can be used for an additional 64 lines, SOS said.

Fifteen Rates

Fifteen different transmission rates are reportedly provided on the board. All 16 lines can use the same rate or a combination of rates. Signaling rates can range from 75- to 19.2K bit/sec.

The SMUX-16 comes with a

10-ft connector cable and a junction that fits inside a standard 19-in. rack. It costs \$1,600 for a four-channel board, \$1,900 for an eight-channel model, \$2,200 for 12 channels and \$2,500 for 16 channels.

SOS Computer Systems is located at 1900 N. Canyon Road, Provo, Utah 84601.

Teletype Has Buffered Unit For 43 Family

SKOKIE, Ill. — A tabletop buffered teleprinter featuring a microprocessor-based controller and 16K bytes of storage is being offered by Teletype Corp.

The Model buffered send/receive (BSR) can automatically send and receive data at speeds up to 180 char./sec. Data can also be entered and edited off-line for future transmission.

The Model BSR was designed to reduce transmission costs and connect time on switched-network time-sharing and message-switching applications.

It can also be used for data inquiry systems, such as credit checking; several inquiries can be entered into the buffer off-line and then automatically sent to the host CPU, which sends back information after each entry.

The 132-column pin-feed teleprinter with a 16K-byte buffer costs \$2,483. An 80-column friction-feed teleprinter is priced at \$2,505.

Teletype Corp. is based at 5555 Touhy Ave., Skokie, Ill. 60077.

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Worth It Despite Surprises Switch to Page Printers Pleases Users

By Jay Woodruff

CW Staff

NEW YORK — Electronic page printing systems are bringing large installations increases in efficiency as well as cost savings, users said at the National Computer Conference here recently.

Two users rated the reliability of top electronic printing systems marketed by Honeywell, Inc., Xerox Corp. and IBM. In each case, however, their switch from impact printers to electronic models did not materialize without some surprises.

Dick Ricketts, administrator of generalized systems and language research at Aetna Life and Casualty in Hartford, Conn., said the lack of standardized coding or embedding mechanisms in the printing manufacturing industry forced his company to develop its own standard called a universal print interface.

"We made the interface for migration insurance," he said. The company uses electronic rather than preprinted forms, saving 53% of the cost of each page and \$80,000 in a shop that prints 14 million pages a month.

The printing systems at Aetna are used in a wide variety of printing applications. Instead of allowing individual machines to be dedicated and software-customized for a few types of printing functions, most machines are available for any kind of task.

Leaving the systems open for all kinds of jobs makes scheduling easier because it is not necessary to wait until a particular printer is free for use, Ricketts explained.

Burp: Heart of Mystery

Joe E. Armstrong, who is now resource director for the Information Services Group at Mars Information Services Corp., was until recently working at Chase Manhattan Bank. That bank prints approximately 1.25 billion lines a month.

Chase has used nonimpact printers since 1974, when it installed a Xerox 1200 system. The move to electronic page printing greatly increased the firm's printing capability, he said, although users had to go through a learning process to take advantage of the system's capabilities.

It was difficult to determine why the machine, which ran alongside impact printers, output incorrect copy everyday just after 4 p.m. The mystery was solved when a worker was noticed as he routinely dumped a box of copy from a printing job next to the 1200, causing it to "burp," Armstrong said.

The machine eventually was isolated in a room of its own where it wasn't bothered by other printers and it didn't bother other dust-sensitive equipment.

With the many printers used at the bank, users found that five powerful nonimpact printers can handle the printing load formerly shouldered by 16 impact printers, he said. Impact printers still see service though because certain applications cannot be handled by the electronic systems.

After his experience at Chase, Armstrong now sees "a real opportunity for us who are devel-

oping these systems to use these [printing] technologies."

High Marks

Asked to comment on the reliability of the electronic page printing systems both companies employed in their large installations, Armstrong gave them high marks.

The company's five IBM 3800s posted a 96% uptime during the first four months of this year, with an average of 36 failures per machine. Each machine was down twice a week for about two hours at a time.

(Continued on Page 44)

High End for CDC Omega Series Has 370 Compatibility, 4300 Power

MINNEAPOLIS — Control Data Corp. is offering a high end for its family of IBM 370-compatible mainframes with the announcement of the Omega 480 Model 3.

The processor, developed by IPL Systems, Inc. of Waltham, Mass., is reportedly positioned between the IBM 4341 and 3031 in power. It will range in cost from \$360,000 for a CPU with 2M bytes of MOS memory to \$560,000 for an 8M-byte system.

To make the system more attractive to first-time users of plug-compatible mainframes, CDC is offering one- and three-year operating leases. A 2M-byte processor will lease for \$13,800/mo on a one-year plan and \$12,000/mo on a three-year plan.

Users with Omega 480 Model 25 can field-upgrade those systems to a Model 3 for \$105,000.

Scheduled for third-quarter delivery, the Model 3 is 1.3 times faster than the published specifications for the IBM 4341, the

firm claimed. It requires less than 25% of the space and electrical power and less than 33% of the air conditioning capacity of a comparably equipped IBM 3031, a spokesman added.

Power requirements for the system are simplified since the system requires neither heavy-duty

electrical service nor a motor generator, he explained.

Microcode used in the system is said to assure total compatibility with the Extended Control Program Support feature of the IBM 4300 line. No further details on this or other features were available at press time.

Knowledge of Firm's Plans Called Vital to Selling DP

By Howard A. Karten

CW Staff

NEW YORK — It doesn't matter if the hardware is the greatest thing since canned beer or if it can leap tall data bases in a single bound, putting your company five years ahead of the competition. If you don't understand the strategic plan of your organization, you won't sell management on investing in that new system.

This was the view of Herbert B. Safford, training coordinator for the Los Angeles Data Center of GTE Data Services, Inc., pre-

sented at a recent National Computer Conference session on how to sell technologies to top management. First of all, a strategic plan is used for developing information service to meet the operational and management requirements for data five years from now, he explained.

New technology should be considered in three types of situations, Safford explained. One is when the need for more timely, complete or accurate information has increased significantly. A

(Continued on Page 46)

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Two Users Like the Switch to Page Printers

(Continued from Page 43)

Xerox 9700 systems did nearly as well during the same time period, posting a similar number of failures a month. But each machine was down longer. Armstrong attributed their longer repair time to a "learning process" Xerox is going through with the relatively new systems and predicted that as time goes on, repair time will be shortened.

Through 1978, Chase's Honeywell Page Printing System (PPS) showed an average uptime of 92%. During the year, the systems were given an increasing workload until, at year's end, they were producing 4 million pages a month, he noted.

Chase has worked to reduce its costs by using partially preprinted, partially flashed forms and by decreasing the number of forms from 15 to four.

Aetna Moved Slowly

Ricketts said the Aetna Xerox 9700 systems, each of which processes 3 million pages a month, have received normal preventive maintenance

and are highly reliable, although he did not have exact figures on their performance.

The company moved slowly, preferring not to use the system at full capacity when they were delivered. Instead, Aetna allocated a small part of printing production for a month or until "everything was worked out." That approach helped keep problems and production snags to a minimum until the system was

ready for a full load of work.

Aetna also use an IBM 3800 system, which Ricketts characterized as "extremely reliable."

A Honeywell spokesman at the session told attendees that his company realizes "there are problems with all page printing systems, but we've run so much printing volume on them that we've been able to solve a lot of them."

"The standard for computer

printing is changing from pre-printed forms to a form that fits an application," he said, adding that technical advances in the past few years have made it possible to flash print forms at the same time the data is being printed, which helps cut costs.

A Xerox representative said that such features as the ability to print on both sides of the paper and the use of 300 by 300 char./in. resolution,

dual-density tape drives and microfiche (as an alternative to paper) give electronic printing systems increased flexibility.

An IBM representative said electronic printing will fit well into the distributed office of the future. "We see organizations that normally print information in headquarters and send it out to distributed locations which can now send it electronically and have it printed there," he said.

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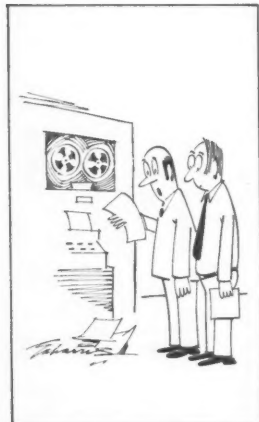
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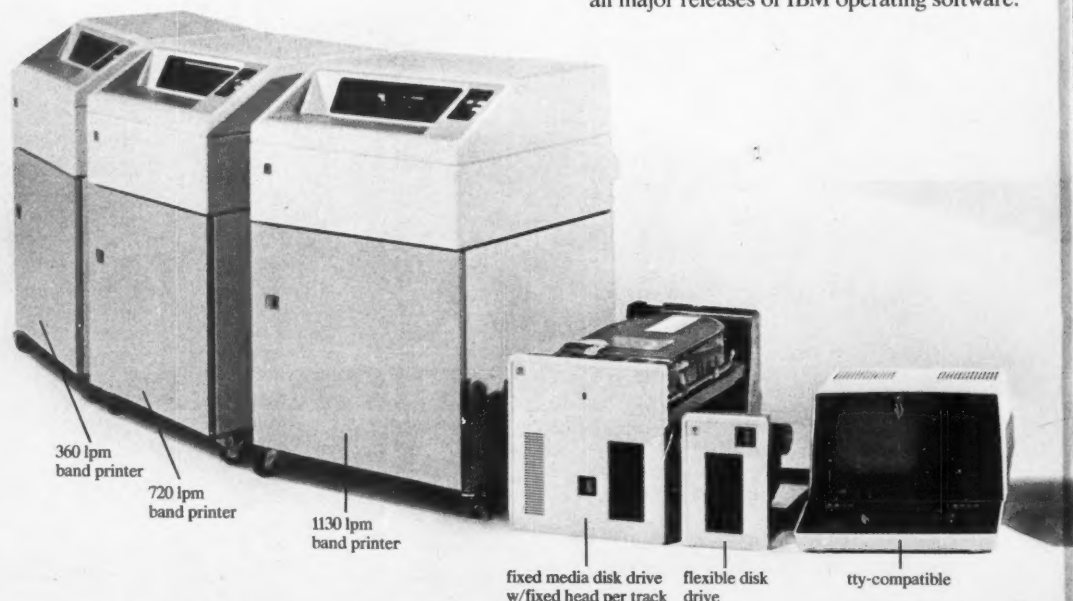
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Micrographics Users Form Group

AUSTIN, Texas — The Houston Instrument Division of Bausch & Lomb, Inc. has announced the formation of a micrographics user group for users of digitizers and digital plotters. Membership in the group is not limited to Houston Instrument product customers; others such as California Computer Products, Inc. customers are welcome as well, a spokesman said.

Although Houston Instrument is sponsoring the group in its initial phases, the company hopes the group will eventually become an independent entity. "The most successful user groups are the stand-alone

ones" that have no connection with a vendor, a spokeswoman said.

The company hopes the group will cover all pertinent aspects of computer graphics and provide a medium of rapid information exchange among members and between the company and the group. Areas of interest to the group are application experience, programming techniques, problem areas and systems building.

Further information is available from Gabrielle C. Ryan, Micrographic Product Manager, Houston Instrument, One Houston Sq., Austin, Texas 78753.

Printer for Retailers Produces 174 Label/Sec

DAYTON, Ohio — A tag and label printer for retailers recently introduced by Monarch Marking Systems, Inc. is said to print a maximum of 174 tag/sec, meeting optical character recognition (OCR) requirements.

The Model 1644 OCR-A Data Dial printer provides a 40-character capacity (four lines of 10 char./line) and is capable of meeting virtually

any OCR formatting requirement, Monarch claimed. Each tag or label is imprinted with one pass of the print head, and a snap-in ink cartridge provides for a minimum of 45,000 impressions between changes.

Labels used in the unit can range from 1.1- to 1.222 in. in width and .95- to 2.31 in. in height. A descending impression counter shows how many tags or labels have been printed during each run.

Representatives of a large OCR service organization will check equipment and print quality through an optional preventive maintenance inspection agreement, a spokesman stated.

The printer costs \$1,925 or rents for \$80/mo, the spokesman said from Monarch Marking Systems at P.O. Box 608, Dayton, Ohio 45401.

Ramtek Unveils High-Resolution Display Monitor

SUNNYVALE, Calif. — A 1,000-line monochrome display monitor recently introduced by Ramtek Corp. features resolution of 1,280 by 1,024 picture elements (pixels) and is aimed at computer graphics and imaging applications.

Available in 19- and 13-in. diagonal screen sizes, the display monitor is said to offer the highest resolution of any monitor available today and has a video bandwidth of 60 Hz to 40MHz.

Dubbed the GM 870 series, the unit is compatible with Ramtek's 850 series of color monitors and is priced under \$3,500, a spokesman stated.

Monochrome display can provide greater detail in graphics applications than can color, allowing monochrome units like those in the GM 870 series to complement systems where rapid readings obtained in a multicolor display must be augmented later by more careful scrutiny, the spokesman claimed.

These applications include medical uses, Landsat applications and radar, the spokesman explained from 585 N. Mary Ave., Sunnyvale, Calif. 94086.

line of miniperipherals even more attractive."

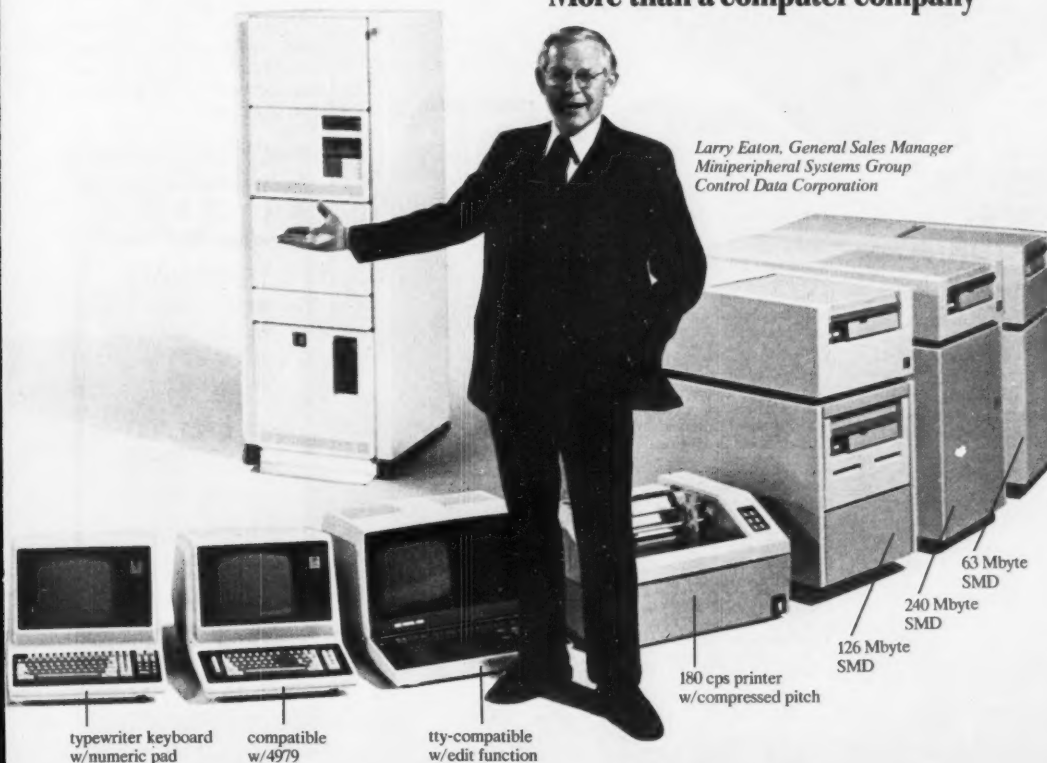
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To Sell DP to Top Brass, Know Firm's Plans

(Continued from Page 43)
second is when labor costs, skill availability or hardware costs have changed significantly.

A third is when the volume of data, multiple processing of transactions, files, reporting requirements or the complexity of procedures has grown substantially.

Those who are trying to sell management on any technology should be aware of seven

management principles. One must understand the company's business and realize that most companies are in business to make money, not to use computers.

It is necessary to understand the philosophy and style of a company's management but that management doesn't need to understand the employee. Moreover, a company must want the technology. A seller (whether of an idea or of a

product) shouldn't try to be smarter than management.

Perhaps most important, unless a proposal makes common sense, it makes no sense at all.

Although it may seem obvious, "no computer systems can be successfully implemented if we do not ensure the availability of major resources," Safford commented. "Ensure that hardware is available, that software is available and that both of

these resources use 'off-the-shelf' technology, if possible."

The personnel situation shouldn't be overlooked when trying to sell a technology to top management. "The shortage of skilled technicians makes it important that our systems are designed to require only a limited need for highly skilled technicians," he advised.

Safford passed on the comment of a management con-

sultant he knows, who said he could pay qualified IMS personnel \$50,000 a year and still make money — if he could find those personnel.

Get Attention

On the practical side, Safford told the audience that the only way to obtain top management support is to get management interested.

How can this be accomplished? "Politics is one way," he said, adding that finding a "champion," or someone with credibility in the organization who will support a potential seller, is the key to this approach. If such a champion is effective, and is convinced "that you can deliver," he will be sure that management is apprised of your plan.

It is important, too, to explain the need for the change. Is the current system obsolete?

In attempting to sell a technology to top management the seller should be aware of the benefit vs. risk equation inherent in that activity. Although a technology may meet management needs faster, provide local control of input and output and provide a more responsive information system, these could be outweighed by duplication of effort, lack of standard controls and difficult audit controls, Safford noted.

Perhaps the "bottom line" to these suggestions is to be in the right place at the right time, try to anticipate what the corporate response will be and have a workable plan.

"Once you've convinced the plan will satisfy corporate needs and you're convinced you can sell it, you probably can," he concluded.



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**IN DEPTH
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FACING UP TO CONVERSION

Part III

BY BENJAMIN E. McMILLAN

DP operations face the same pressures as any business entity. They must also perform the same fundamental functions as any other business enterprise if they are to be successful.

Detailed planning is an important responsibility of the DP manager because of the rapid changes in DP technology, the ever-changing needs of users, the scarcity of talent within the company, the time necessary for systems development and the changing face of computer services in the marketplace.

Detail planning begins by identifying the necessary elements that comprise a complex computer function. Part 3 of this four-part series will point out some of these important elements in detail and will attempt to outline them in the form of general guidelines that may be used for computer system conversion.

Long-Range Plans

The long-range plans and objectives of a company are important to the future direction of the computer function.

Ideally, a company should publish a statement of goals and objectives for the guidance of its management and staff. Lacking this goal statement, a company should have a long-range business plan from which the implied company goals can be extracted. In the absence of either of the above, the DP manager must have access to the chief executive in order to obtain a verbal explanation of company goals.

Although company goals and objec-

tives must be known in the broadest terms, some details are also needed. For example, the financial plans or problems of the organization must be spelled out, particularly in the area of capital requirements. If capital needs are very extensive over the next few years, it might be wise to lease computing equipment rather than plan for

In Part 3 of this four-part series, McMillan presents guidelines for analyzing an organization's DP function and setting up appropriate conversion plans.

outright purchase.

In addition, an indication of the size and availability of operating budgets is important in order to assist in the determination of a proper time-phased plan for activities.

Other key items to be considered are marketing plans and new product line development: Does the company plan to be in a new business? Are there plans for developing new products? If so, will this development require new operating systems in purchasing or accounting?

If the plans call for an acquisition, this change could result in the integration of dissimilar systems, which in turn may call for a remote computing capability.

Consideration must also be given to the company's plans for operational improvement, because these increased needs could severely affect computer demands. Does the company plan to build a new facility? If so, will teleprocessing be necessary to support it?

For long-range planning, it is necessary to understand the trade-offs that have to be made between short-range and long-range problems. In this part of the planning process, information must be obtained concerning those tasks the company is planning to accomplish or directions in which it is going which will place greater demands upon the computer function.

One particular concern that should be considered is the changes that affect organizational functions through modifications of current responsibilities or the addition of new responsibilities.

The DP manager must be able to analyze the types of long-range plans mentioned above and integrate the future plans of the DP function with them. The DP group should have overall plans for hardware and manpower that are ahead by at least three years. These projected requirements should take into account the expected growth of current applications, as well as special hardware and staff needs for the future.

Such a plan enables management to start early on equipment planning, systems design and staff development. It also gives the company some badly needed guidelines for screening the growing flood of new computers and related hardware. Lacking such guide-

lines, some companies, even before breaking even on their initial installation, have actually upgraded their original equipment for larger, faster, costlier models, without any concrete plans for profitably controlling the added capacity.

System Objectives

Once the company's plans are known, it then becomes necessary to state the objectives of the computer function. Burton J. Cohen, in his book *Cost-Effective Information Systems*, stated, "It is as important for the activities of the information systems function to be consistent with the firm's objectives as it is for any other function." Identifying the key objectives points the computer effort toward developing successful applications.

In addition, the process of setting formal objectives for the DP effort demands precisely the kind of top management interest and involvement that is so important to success in the DP area. If the department heads are in agreement over these objectives, then most conflicts concerning priorities and resources will be averted.

If the company's systems staff starts with these defined objectives, it should be able to develop a comprehensive list of potential applications. The applications should be ranked in the order of their contribution to the defined objectives of the program, as the systems staff judges it. For each application, there should be a list of cost savings, benefits, required investments in man-

(Continued on Page 50)

IN DEPTH

(Continued from Page 49)

power and speed of payback.

At this point, some companies make a distinction between tangible and intangible benefits.

To prepare such a list, the systems staff will obviously need the help and cooperation of the users who would be affected by the particular application. Right from the start, this expected cooperation helps to open communications channels between the DP function and the user group. Unless line management takes active responsibility for detail planning, implementation and review, no computer application stands a very good chance of succeeding.

While long-range planning offers some general guidelines for directing a DP function, setting specific goals offers a means of measuring the progress within the long-range plans.

In an overall view of what the DP manager is trying to achieve in terms of a successful computer system, goals appear very important, but the steps that are taken to achieve them are just as important.

Each step should be treated as most important until it is completed.

The basic foundation for achieving any goal or objective, whether complex

or simple, is planning.

The planning process was described well by Edward A. Tomeski in *The Computer Revolution* when he said, "The process of planning is best described in a somewhat broad context, for planning should function with the keenest awareness of the organization's well-being in mind."

Two Categories

Plans usually fall into one of two categories: long-range, or strategic; and short-range, or operational.

Long-range planning, as discussed earlier, involves the development of strategies and the allocation of organizational resources in order to achieve objectives. Short-range, or tactical, planning normally consists of operational plans to attain subobjectives.

This discussion focuses primarily on tactical planning. It assumes that the long-range plans of a computer function have already been established. The following guidelines are aimed at helping managers attain objectives and making sure they are aligned with the overall objectives.

Tactical plans should include the necessary steps or project phases in achieving the desired goal, a successful DP system. In the plans for conver-

sion, project phases must be included that would not be considered in a new installation.

While trying to establish these tactical plans within the boundaries of the long-range plans, certain questions are sure to arise. One of them may be: "The users can't tell me what they'll be doing years ahead, so how do I know what I need?" Or maybe: "How can I tell if I don't know what the technological advances will be then?"

These problems may seem to stand in the way of a successful DP system, but in five years, the users will probably be doing their work very similarly to the way they are doing it now. In addition, the operational aspects of DP functions probably will be the same and there may be only slight changes in the physical attributes and the cost.

Precision Not Necessary

The plans do not have to be precise, and a broad plan is better than none at all. Frederic G. Withington, in his article "Should You Upgrade? How Do You Know?" [*Datamation*, September 1973], presented a broad outline for the planning.

First, there should be a starting version of the tactical plan which is to be performed by the users. The first plan

may be very rough and sketchy, but it should get better in later cycles. If the users know they are actually taking part, they will be very cooperative. In addition, top management will probably understand it well.

Next, a rough outline of items involved in the tactical plan should be developed. These items would include equipment and personnel requirements and cost-savings projections. These help make the plan desirable as well as help determine what changes are necessary. It is difficult to say what the cost savings will be, but they will be taken care of in the cycles.

If the tactical plan is to be met, the budget must be established in terms of the required actions, primarily for the development of the system; but it can also include equipment and personnel acquisitions. If the first step is taken out and the timing is right, equipment upgrades can be planned this way.

During the first year, things may not work according to the detail plans and budget. New developments, changes in user requirements and acquisitions may not allow the measurement to be accurate, but this limitation only means the plan will have to be revised.

Revisions should be made annually unless something significant happens.

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FACING UP TO CONVERSION

IN DEPTH

Each cycle makes the tactical plans better and the long-range plans closer to reality.

The content of an effective plan must be tailored primarily to the individual or group on which ultimate responsibility for its use rests. Usually the executive in charge of the DP function reviews the computer organization's plans.

A plan must sell itself through a step-by-step buildup of a situation to justify the recommended actions, and a plan ideally answers these kinds of questions: Where are we now? How did we get here? Where are we going? Where would we like to go? Is it necessary to change to reach our objectives?

With these types of questions, the planner can apply more specific measures of performance and results to emphasize certain steps of action arising from clearly identified needs. And it is very seldom that an organization can honestly say that its present projections place it in a position to meet all future objectives.

In a survey of computer conversion (discussed in Part 2 of this series) 47 managers responding in a questionnaire were evenly divided on the question of whether detailed guidelines for conversions could be developed for all phases. Three strongly agreed, 20 agreed, four had no opinion, 18 disagreed and five strongly disagreed.

In addition, there was no significant difference of opinion between those managers with a special staff and those without one.

In planning for change, it is rarely possible to draw up a complete plan covering every aspect, but detailed planning is necessary in order to minimize unforeseen events.

As mentioned earlier, it is important that everyone who may even remotely be affected by the planned change be fully informed of what the arrival of the computer will mean both to him and the company. A special aura surrounds DP systems, and fears and anxieties must be nipped in the bud. Unless the full cooperation of all staff is obtained, it will be difficult to bring about the change smoothly.

Feasibility Study

The objective of a feasibility study is to provide management with enough information about the proposed system so that its potential worth can be evaluated. The existing system must be investigated, alternative solutions to the problem defined, alternatives compared with the existing system and an alternative chosen and supported with economic justification.

The preliminary analysis and requirements determination must be carried out in sufficient depth to allow both technical and economic evaluation of a proposed new system (see box).

Prior to the feasibility study, a study team or special study staff should determine if any changes are necessary. This team will be used to review the system objectives to see if they are be-

ing met, and if not, what can be done to meet them. It is important to have a special staff because, as mentioned earlier, the regular staff usually does not have the time to spare from its regular duties.

William F. Boore and Jerry R. Murphy, writing in *The Computer Sampler: Management perspectives on the Computer*, suggest that the study team be composed of knowledgeable representatives from each of the departments that will be directly affected by the change, plus systems analysts if the company has them on its staff.

Generally, managers are the best representatives to have on the team, since they have the authority to speak for their departments. A successful study is not possible without extensive collaboration between all the affected departments. Even though the systems analyst has responsibility for the study, the other members are used for the necessary feedback to accomplish the task.

Planning on this level is very important. The system's success depends on the thoroughness and competence of the team.

Outside Auditor, Consultants

Some large corporations employ outside auditors and consultants to assist with the study phase. The usual role of outside auditors in computer systems studies is to review the proposed new system to make it conform to good accounting practices. A second function is to help in establishing proper audit trails.

In many cases, the outside auditors want to establish their own computer program for use in making annual audits of the new system. Their participation in the feasibility study helps establish a base for such programs.

The role of the outside consultant in a systems study is threefold:

- To provide a general appraisal of the company's new system in order to assure management that the changes are sound and that the results expected from a switch to a new system are realistic.
- To provide the company's staff with technical know-how about making the systems study, what information to collect and what procedure to use for designing the new system.
- To provide a trained staff to carry out the study of both current and proposed new systems for the company.

Current System Study

Many companies do not make a detailed study of the current system. However, in the conversion process, the omission of this step could result in unnecessary acquisitions. Many companies develop the philosophy of cleaning up the present system, installing a new computer and working on the new ideas later.

A detailed study of the current system can uncover weaknesses and fallacies in its design. In addition, it can determine if the system design is meeting the previously defined objectives.

(Continued on Page 52)

Phase I. Feasibility Study (Survey system and develop proposal for study.)

1. Conduct preliminary review of present system to determine whether system is necessary.
2. Determine general areas where improvement is desirable.
3. Summarize and evaluate preliminary survey findings.
4. Define problems or areas where possible improvement is foreseen.
5. Establish study objectives.
6. Determine methods and organization of study.
7. Recommend study project to management.

Phase II. Analysis and Recommendation (Develop detailed systems recommendation.)

1. Prepare detailed analysis of existing system.
2. Explore effects on related systems and activities.
3. Determine current system costs.
4. Develop alternative system solutions.
5. Prepare comparative cost analyses.
6. Determine best solution and prepare functional flow of proposed system.
7. Assemble project information into formal proposal.
8. Coordinate proposal with all affected organizations.
9. Present report of recommendations to management for approval.

Phase III. Operations Planning

1. Secure master schedule.
2. Prepare necessary interdepartmental procedures and orient personnel.
3. Provide for procurement of necessary equipment.
4. Provide for procurement of necessary forms.
5. Prepare detailed I/O requirements.

Phase IV. Programming

1. Provide detailed flow diagrams (documentation) for preparation of computer programs (new and/or those to be converted).
2. Provide detailed flow diagrams for use of other processing equipment (if required).

Phase V. Systems Trial and/or Paralleling and Installation

1. Maintain parallel systems in operation (old and new).
2. Eliminate "bugs" in new system. (Since this step is an ongoing process, it will probably be overlapped by all following steps.)
3. Coordinate installation of new system and abandon parallel operations.

Phase VI. Follow-Up and Review

1. Within a period of six months after installation of new system, an audit should be made to evaluate actual results.
2. Compare actual costs and savings to predicted costs and savings.

Suggested Conversion Steps



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(Continued from Page 51)

This study of current systems provides the answers to the questions, "Where are we now?" and "How did we get here?" The depth of the detailed investigation is usually determined by the extent of the relationship between the existing system and the prospective shape of the new system.

Following is a list of important reasons for analyzing the existing system:

- Detailed knowledge is required to ensure that all relevant activities of the

old system are included in the new one.

- Detailed knowledge of current procedures will provide important guidelines for designing a new system that is practical.

- An accurate evaluation of the cost savings and other advantages of the new systems can only be gained from a good knowledge of the old system.

- The systems analyst must know the existing system to be able to plan and organize an efficient changeover

to the new one.

- The systems analyst will need to justify all his recommendations to line management and his own management, based on facts he must know are correct, in order that he may convince them that the proposed system will be capable.

Alternative Solutions

After it has been determined that the present system is approaching capacity, it will be necessary to make a study

of alternative solutions. The systems analyst will make a short interim study of the area involved. The purpose of this study is to determine the feasibility of achieving the objectives, to estimate the cost of the project, to provide a guide to the amount of time needed for the full-scale study and to allow all on a schedule to be drawn up for its completion.

The main source for the information needed by the analyst is generally management, and the kind of informa-

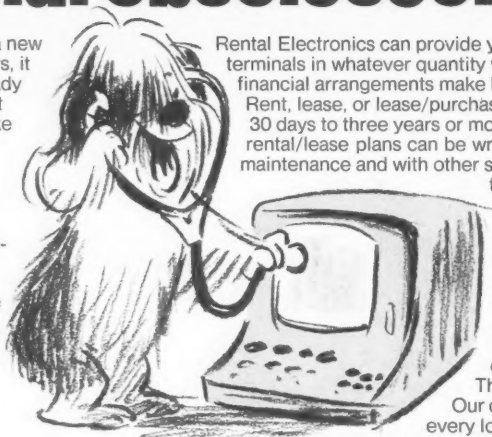
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...

tion needed includes the volume of work, the current backlog, the time needed to process work through the system (turnaround time) and the number of personnel involved.

If it is decided that improvements are feasible, an assessment must be made to establish if they can be made at an economical cost. A great deal of money and time can be saved if at this point the conversion plan is deemed impractical because of economic reasons or timeliness and is discontinued.

This is the point of no return. If the feasibility study extends beyond this point, the decision to make the necessary changes must have been made. The cost and time used for a full-scale study would be lost if, in the end, the changes were not made.

The full-scale study is normally carried out over several months and culminates in a proposal to management. In the course of the study, both the main features of the new system and the configuration of the proposed equipment are determined. In addition, the basic design of the system is a part of the study.

The feasibility study answers three very important questions:

1. Can the job be done with existing technology?
2. Can the job be done economically; that is, do the benefits warrant the costs required for achieving them?
3. Will the proposed system work?

The first question can be answered easily. The state of the art of DP tech-

nology has advanced at such a rapid pace that it has gone far beyond man's capability of using it properly or efficiently.

With regard to the second question, many times the system development and eventual operation costs are compared with the benefits of the proposed application. But these two items cannot be compared based primarily on the dollar aspect. The comparison fails to take into account the previous opportunity to apply the system development talent and resources to other areas much more important to the company.

In addition, the person that assesses the benefits should be capable of evaluating the full potential effect on the business operation as a whole. This task belongs to an experienced business manager.

The second question answered more fully in the resulting proposal and justification for the new system. These topics will be discussed in the fourth part of this series.

The third question is asked more in the sense of whether the system will be used and how this can be assured. Because the users are to receive the output from the new system, the answer to this question would be a factor of the effectiveness of their motivation and education.

The feasibility study is the most important step in the conversion process. It is the starting point for all subsequent steps in the process (See box).

Earlier, it was stated that the proposal is one of the results of the feasibility study. The proposal is essentially a request for management to allocate the necessary dollars and resources to implement the new system. It is top management's responsibility to evaluate the proposal to determine its importance and to make a business decision whether to commit the necessary funds and talent.

This step in the conversion process can become very awkward. If top management is not sufficiently knowledgeable about DP systems, the approval of the proposal and justification phases of the system have to wait until

management is educated. Top management has to gain enough knowledge about computer systems to make an independent judgment.

Confusion is common at proposal time. If management is listening to conflicting claims by manufacturer representatives, then a controversy between operating managers results. It is difficult for top management to make proper decisions if there are arguments among its technical advisors. Business managers should be forewarned of this situation and the education of top management should begin early.

The format of the proposal is not important. (Continued on Page 56)

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IN DEPTH

(Continued from Page 53)

portant as long as its content enables the decision-making executive to evaluate it properly. The proposal should contain, for example, objectives, system outline, equipment specifications and cost, system development cost and project phases.

The top executive may not be interested in all those points, but all should be included. It is better to cover more than is necessary than too little.

In the past, there was a traditional

way of justifying a computer system; and some companies, to their disadvantage, still use it. Management required the quantification in terms of displaceable cost and tangible benefits. The intangible benefits were included but there was no price tag attached to them. Yet, often these intangible benefits were the reason for justification.

According to Joseph Orlicky, writing in *The Successful Computer System*, "there are no intangible benefits, only benefits difficult or impossible to mea-

sure in advance." With the conversion process, the justification has to quantify these difficult benefits. Factors such as increased user demands, better turnaround time and better response time are very difficult to express in dollars and cents.

In order to solve this problem, one must assign values to the benefits and estimate the probability of attaining them. Because the values are assigned rather than calculated, top management has to be persuaded to accept the

approach; but it is easier to pinpoint the responsibility for the so-called intangibles.



Benjamin E. McMillan is a specialist in computer systems acquisition for General Dynamics Corp. in St. Louis.

His work involves identifying opportunities for standardization and multi-site utilization and volume purchase and/or lease arrangements for equipment, materials and supplies for computer centers. He investigates new equipment and supplies as they reach the market and arranges to test, evaluate and make recommendations on their use by DP organizations within General Dynamics.

He also assists computer centers in preparing forecasts of future equipment and material needs.

McMillan holds a B.S. in mathematics from Central State College in Edmond, Okla. and an M.B.A. from Pepperdine University of Los Angeles.

Small Business Systems Surveyed Microdata Reality Gets Top User Rating

Microdata Corp.'s Reality, Basic/Four Corp.'s Model 400 and the IBM System/3 models 6, 10 and 15 reaped the highest marks in Management Information Corp.'s (MIC) fourth annual small business systems users survey.

To assess how well small business systems are meeting users' needs, MIC polled 568 companies that use 689 small business CPUs.

Each respondent was asked to subjectively rate the vendors and their products on performance (whether stated equipment specifications have been realized), reliability (uptime vs. downtime), ease of use (amount of time necessary to train new personnel), service (maintenance) and vendor support (such as advance training and program assistance).

A four-point rating scheme was used (1 = poor, 2 = fair, 3 = good, 4 = excellent). The survey results were given as averages of the ratings assigned to each product in each of the five categories.

The Microdata Reality, Basic/Four 400 and System/3 Model 10 and Model 15 were the only small business systems to receive ratings of 3.0 or higher in all five categories.

Taking the average of all five categories, the Microdata Reality topped the field with

a score of 3.66 (based on 27 respondents using 55 units). The Reality earned 3.8 in performance, 3.8 in reliability, 4.0 in ease of use, 3.4 in service and 3.3 in support.

Based on nine respondents with nine units, the average for the IBM System/3 Model 15 was 3.6. This system was rated 3.6, 3.8, 3.6, 3.7 and 3.3 in performance, reliability, ease of use, service and support, respectively.

Eight users with 17 Basic/Four 400's gave that system an overall rating of 3.5. In performance, reliability, ease of use, service and support, the system was rated 3.5, 3.4, 3.8, 3.4 and 3.4.

Following this order, the IBM System/3 Model 10 was

rated 3.3, 3.5, 3.3, 3.3, and 3.3, respectively, by 34 users with 45 units. The System/3 Model 6 received 3.4, 3.7, 3.7 and 3.1 ratings in performance, reliability, service and support, respectively, by eight users with eight units.

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Rigorous Planning Urged Turnkey Success Not Automatic: Panel

By Jeffrey Beeler
CW Staff

NEW YORK — Prospective users should distrust the common vendor claim that turnkey minicomputer systems require little or no effort to install.

A successful small systems installation demands much more work than simply plugging in some hardware and turning a key. The process is long and involved and requires careful planning and attention every step of the way, a panel of computer consultants said at the recent National Computer Conference here.

The panelists, who clearly intended their remarks for vendors and first-time users, spoke at a "how-to" session on planning, acquiring and implementing small business

systems.

Included on the panel were Howard Perskey, president of Howard Systems International, Inc.; Richard Hoberman, a manager with the Seidman & Seidman accounting firm; and Victor Goldberg, a principal of Peat, Marwick, Mitchell & Co.

Perskey, whose remarks stressed installation planning, likened the acquisition of a small business system to the purchase of stereo equipment. With both types of hardware, he said, inexperienced users usually find themselves inundated by a flood of unfamiliar terminology and flummoxed by an astonishing variety of brand names.

To help ensure satisfactory progress through this baffling product maze, users should carefully define their business needs

before proceeding further into a systems installation. Attempts to analyze user requirements usually prove tedious and time-consuming, but the more energy devoted to the effort, the speedier the hardware selection and the greater the chances of a successful installation.

After defining their business needs fully, users should next undertake the demanding task of picking the appropriate system. Most users will begin their selections by drafting a request for proposal — basically a general description of their business procedures and requirements — and sending a copy to each of several promising minicomputer vendors, Perskey said.

They will then have to analyze the responses to determine which vendor can best meet their individual computing needs. Many users will probably have to rely on a qualified consultant to help guide them through this phase of their systems acquisition, he added.

'Musts,' 'Wants'

After collecting all their vendor bids, users should divide their application requirements into two classes — the "musts" and the "wants," Hoberman advised. Any supplier that proves unable to satisfy a "must" requirement should be dropped from the competition immediately.

After collecting all their vendor bids, users
(Continued on Page 60)

Mini-Based System Collaring Costs of Court Management

Special to CW

CONCORD, Calif. — A mini-based court management system has put the arm on costs and made more information available more quickly to officials — even as court activity in this northern California county has jumped by 40%.

Contra Costa County has taken the first step toward a distributed DP network that will eventually manage the county's entire criminal justice system, according to Tom Falce, director of the Law and Justice Systems Development project.

Data General Corp. Nova 3 minicomputer systems in each of the county's four lower courts process parking tickets and prepare court calendars, Falce said.

Each Nova 3 is equipped with a 32K-byte core memory, 10M-byte disk, three DG Dasher display terminals and medium-speed printers. Application software is written in Interactive Cobol, the high-level, transaction-oriented business programming language designed for DG's commercial systems family.

Making a Dent

The minicomputer systems have made a dent in the growing workload of traffic cases, Falce said. Contra Costa is California's eighth largest county, with a population of 600,000. In recent years, the

rising incidence of illegal parking has been one of the local government's major concerns. The city of Walnut Creek, for example, issued 50,000 parking tickets last year.

Until recently, the county kept track of those parking tickets manually. To ease the workload and to step up the flow of information among the county's criminal justice departments, the county formed the Justice Automation Advisory Committee, which recommended automation as the most economical solution.

The county already had an IBM 370/158 at its central DP facility in Martinez, Calif. The mainframe was processing payroll, maintaining welfare records and calculating property taxes. But, Falce said, it was operating in a batch mode and was overworked.

"The economies of minicomputers and our other needs led us to conclude that distributed processing was the solution to our problem," Falce said.

Cobol-supported minis would make the machines compatible with the county's mainframe and would make the development of applications programs by county DP staffers that much easier, he added.

The minis went on-line in the spring of 1978 and have been managing the whole parking system for more than a year. Falce compared the parking system to "a high-

(Continued on Page 60)

Card Reader Links To IBM Series/1

WHARTON, N.J. — IBM Series/1 users can get card reader capability through an offering from Series 1 Plus.

The Model 970 consists of a 300 card/min vacuum-feed optical card reader and a Series/1 plug-compatible interface. While the hardware is available immediately from the firm, the system with software will be available Aug. 1.

Besides the Model 970, Series 1 Plus also offers 300- and 600 line/min printers and removable pack disk drives, all plug-compatible with the IBM Series/1.

The Model 970 will cost around \$6,000, available from the vendor at Richard Mine Road, Wharton, N.J. 07885.

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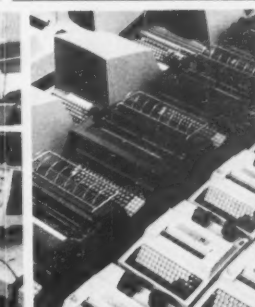
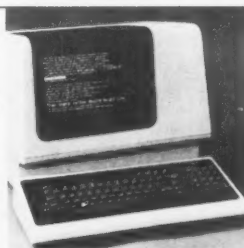
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Logger Runs on Battery

MANSFIELD, Mass. — A cassette data logging system operable by battery and needing no separate amplification system has been announced by Datal Systems, Inc. The Model LPS-16-12B5 runs from a single 12 Vdc power source requiring 900 mW when recording and 10 microW during standby, according to a spokesman.

The unit's AM-201 variable gain amplifier, internally mounted in the system, is factory set at 100, but can be set anywhere between 1 and 500 by user selection of a resistor inside the unit, he added.

In incremental recording, the cassette tape moves only when information is presented in order to conserve power and tape, the spokesman noted. The unit features eight differential channels that can be either randomly or sequentially multiplexed at a maximum rate of 5 channel/sec.

A two-step gap is created at the beginning of each of these 16-bit words and a whole-gap word is generated at the end of each file.

The system can be ordered with several different length files, from one to 64 words long. The Model LPS-16-12B5 consists of four plug-in cards, mechanical transport and a mother board card interconnecting them. It costs \$1,450 form Datal at 11 Cabot Blvd., Mansfield, Mass. 02048.

Direct Data Channel Improves PDP-11/70's I/O Performance

SANTA CLARA, Calif. — A Direct Data Channel (DDC) that is said to improve I/O performance for Digital Equipment Corp. PDP-11/70 users has been introduced by Carl H. Boehme & Associates, Inc.

By allowing any standard Unibus peripheral to be connected to the PDP-11/70's cache bus, the channel reportedly permits systems to combine the features of standard Unibus peripherals with the high data throughput rates of the Massbus.

When peripheral devices are connected through the DDC controller, data transfer rates then approach those obtainable on the Massbus rather than those of the slower Unibus, according to a Boehme spokesman.

In addition, the DDC controller is said to allow direct reading from memory, thus increasing the cache effectiveness. This reportedly eliminates the reduced cache hit-miss ratio that exists when Unibus reads go through cache memory.

Since memory writes from DDC-controlled devices are

32 bit/access while writes from the Unibus are 16 bit/access, the DDC-controlled devices requires half as many memory accesses as Unibus, the spokesman claimed.

In addition, DDC-controlled peripherals can operate in burst mode, resulting in higher transfer rates without interfering with Unibus activity, the spokesman said.

DDC-controlled peripherals directly access the PDP-11/70's 22-bit address space, the spokesman said, eliminating the need to allocate and load

Unibus map registers. The DDC controller allows the system designer to specify peripherals that were designed for pre-11/70 architectures.

The DDC controller plugs directly into the mainframe of the PDP-11/70 and occupies on RH70 controller slot. RH70 and DDC controller can inhabit the same mainframe; the DDC controller has a Unibus receptacle.

The price for a DDC is \$12,000. Boehme is at 2076-C Walsh Ave., Santa Clara, Calif. 95050.

Wire-Wrap Modules Fit Variety of Minicomputers

ORANGE, Calif. — Wire-wrap modules for a number of popular minicomputers are available from MDB Systems, Inc.

MDB has announced a hex wire-wrap module for Digital Equipment Corp.'s PDP-11 family; a wire-wrap half-board for Perkin-Elmer Corp. minis; a quad wire-wrap module for DEC PDP-8s, PDP-11s and LSI-11s; a dual wire-wrap

board for the LSI-11; full wire-wrap boards for Data General Corp. and Perkin-Elmer systems; and two boards for the IBM Series/1.

The modules plug directly into the host computer backplane to connect all bus signals, MDB explained. All boards have two-level wire-wrap posts on the component side of the module so the board is mounted in a single chassis position.

All will reportedly accommodate any .3-, .4- or .6-in. center dual in-line packages.

The modules are priced from \$75 for the MLSI-WWB1 to \$495 for the IBM-WW72 or IBM-WW64. The PDP-11 hex wire-wrap board costs \$195 and the half-board for Perkin-Elmer CPUs goes for \$275.

MDB Systems is located at 1995 N. Batavia St., Orange, Calif. 92665.

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Do You Remember?

TULLAHOMA, Tenn. — Do the minicassettes used for data storage predate the Beatles?

The origins of this application of cassettes "are lost in the annals of minicomputer history," according to the author of a recent Datapro Research Corp. report [CW, May 21]. With tongue in cheek, the author speculated that "some scientist or engineer happened onto the idea one night about 10 years ago, quite by accident, while watching his teenager record a Beatles record..."

Responding to *Computerworld's* summary of the report, Prof. Fletcher W. Donaldson of the University of Tennessee Space Institute recalled seeing a cassette used for data storage on display at the 1963 Association for Computing Machinery Conference in Denver.

"Since I was attending all major conferences in those days, I am sure this was their first appearance," Donaldson

wrote. "I am not sure if it was a Philips cassette."

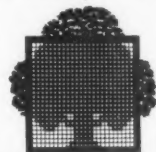
Donaldson could not remember who presented that display 16 years ago. Anyone able to shed light on this mystery — and perhaps write some history — is invited to contact Brad Schultz at *Computerworld*, 797 Washington St., Newton, Mass. 02160.

Correction

An account of National Semiconductor Corp.'s Starplex development systems family mistakenly attributed the products to Intel Corp. [CW, May 28]. The article also gave 2900 Semiconductor Drive, Santa Clara, Calif. 95051 as Intel's address. That is actually National Semi's location.

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Based on Microprogrammed CPU Mini Offers Technique Halving Access Time

SAN DIEGO — A minicomputer with a memory interfacing technique that reportedly nearly halves the time required for an I/O device to access memory has been introduced by Digital Scientific Corp.

The Meta 4/5030 is based on a microprogrammed CPU said to be capable of sustained instruction execution rates

and throughput performance equal to many 32-bit machines. More than 2M bytes of 500 nsec semiconductor memory can be added to the Meta 4/5030, qualifying it for use in high-activity terminal environments, according to a spokesman.

Standard hardware features include memory protection, memory error de-

tection and the Sentry system monitor, which indicates any ac or dc voltage variances or system-cooling parameters through visual and audio alarms. If the system shuts down, indicators on the Sentry panel show the field engineer the problem.

The 5030 is driven by the Multiprogramming Time-Sharing Operating System (MTSO), which supports concurrent time-sharing, teleprocessing and batch-mode processing.

Supporting Cobol, Fortran, Basic, APL and RPG-II, the operating system requires a maximum of 64K bytes of memory. The remainder can be divided into 16K-, 32K- or 64K-byte partitions, the firm said.

Other features include support for up to 32 interactive or batch partitions, I/O spooling, card reader double buffering and spooling and a security password system.

A typical Meta 4/5030 system configuration for running MTSO is comprised of 256K bytes of memory, a CRT terminal, a 600 card/min reader, a 600 line/min printer, 200M bytes of disk capacity and support for 16 asynchronous communications lines. Such a configuration costs \$138,225 or \$3,200/mo on a five-year lease. Maintenance on the configuration costs \$1,200/mo.

Digital Scientific is at 11425 Sorrento Valley Road, San Diego, Calif. 92121.

Swaps With Floppy

Fixed Disk Drive Unveiled

CHATSWORTH, Calif. — An 8.25-in. fixed media disk drive, mechanically interchangeable with an 8-in. floppy disk drive, has been introduced by the Peripherals Division of Pertec Computer Corp.

The Model D8000 uses Winchester technology and has a capacity of 20M bytes. The advantage of the unit, according to the manufacturer, is that a user can get 20M bytes of storage from the same space that once afforded a maximum of 1.6M bytes.

In addition, the user gets faster access time, eliminates media wear problems and spends as much as 40% less time than he would on a full-size rigid disk drive, a spokesman claimed.

Simplified Communications

The D8000 interface employs bi-directional command/status bus and byte-oriented data transfer to simplify communications between the drive and the computer, the spokesman said.

An average seek time of 50 msec is said to be enhanced by a rotary positioner driven by a limited rotation dc motor. The D8000 records at a density exceeding 6,000 bit/in. and transfers data at a nominal rate of .87M byte/sec.

The D8000 costs \$1,500 to \$1,800, depending on the quantity ordered.

Report Gives Advice To Top Brass on WP

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W. Germany	6,527,000,000	7.9	3
United Kingdom	4,794,000,000	5.8	4
France	4,768,000,000	5.8	5
Canada	2,301,000,000	2.8	7
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Court Management System Puts Arm on Costs

(Continued from Page 57) volume, accounts receivable type of application." Administrative personnel at each court enter citation data into the computer, which determines if the violation is legitimate, calculates the bail or fine and later records payment and subsequent court actions.

If no payment is made, the violator is identified from Department of Motor Vehicle records by communication between the court mini and the county mainframe and a tape-to-tape interface with the Motor Vehicle Department.

Nonpayment generates a late notice in a self-mailer form that is sent to the car owner. If there is still no response, a "hold notice" is sent to the Department of Motor Vehicles via the court system and the mainframe, prohibiting that individual from renewing his auto registration until the parking fines are cleared.

In addition to setting the amount of bail and reporting the collection, the system also

records nonstandard or exceptional violations — those committed by persons with out-of-state registrations or multiple violations.

Criminal Calendar

The Nova 3 systems have made their case in scheduling the criminal calendar, too.

The criminal calendar application schedules the activities in the county courtrooms and details the resources available and reporting actions taken by the courts on the cases scheduled. This application essentially designates the who, what, when, where and why of a particular case and prepares an agenda.

These case details are input to the systems, the agenda is compiled and reports generated on the system printers are distributed to the parties involved.

Case data from individual courts is also examined to determine if a defendant has any other offenses pending in another court in the county.

One added benefit of the

court calendar application is that the systems are used to calculate statistics on the frequency and type of offenses committed in the county, Falce said. These statistics meet state and federal reporting requirements.

The Nova 3s operate day and night. During the day, the systems are running on-line with interactive Cobol, but at night the systems transmit information to the IBM mainframe using an IBM-compatible com-

munications software package called RJE80.

The remote job entry control program lets the IBM processor talk to the remote systems, collect data from their files and update their data bases. In the evenings, the 370 calls the CS/40 software-based minis, and the unattended remote systems respond with the information requested.

Contra Costa County is do-

ing the same tasks with small computers that other court systems are accomplishing with larger ones, Falce noted, adding, "But this is only the first step is a series of computer installations for the whole criminal justice system."

In the next few months, he expects to double the system memory and disk space. And he wants to add a third application to process moving traffic violations.

Careful Plans for Turnkeys Urged

(Continued from Page 57) should divide their application requirements into two classes — the "musts" and the "wants," Hoberman advised. Any supplier that proves unable to satisfy a "must" requirement should be dropped from the competition immediately.

To rate the remaining vendors, users should first divide their "want" requirements into five categories — software, support, hardware,

price and availability, Hoberman said. Of these five groups of needs, software is by far the most important, with support placing second and hardware running third.

On a scale of one to 10, users should then subjectively rate the remaining vendors according to each category and add the numbers to obtain a total score for each firm. From the resulting figures, users can roughly gauge each competitor's ability to supply a system that can meet their business needs.

But before making a final commitment to one supplier, users should find out if the prospective vendor has ever served any other customer in the same business as their own, Perskey recommended. If the vendor has served such clients before, users should obtain the customers' names and ask them to rate the supplier and its products.

By investigating the experiences of seasoned users in the same business, first timers can uncover vendor shortcomings

that would otherwise go unknown, Perskey noted. The procedure also provides an excellent means of evaluating a supplier's support.

In selecting a minicomputer vendor, would-be users should bear in mind that installations usually fail, not because of difficulties with either hardware or software, but because the two elements fail to mesh as a single, integrated system, Goldberg said.

After finally choosing a vendor and specifying the system to be installed, users should draft a contract that clearly spells out all the major terms of their agreement with the supplier. A contract should specify all delivery dates and make sure that users will receive equipment compatible with their operating environment and power source, Perskey said.

When the equipment is finally delivered and the installation begins in earnest, users should appoint an implementation leader to oversee the job, he advised.

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Personal Computers Seen Sweeping U.S.

By Jay Woodruff
CW Staff

NEW YORK — Yearly sales of personal computers could reach 7.5 million by 1990; by 1997, more than 40 million personal computers may be found in homes across the U.S.

These and other estimates drawn from a preliminary report on personal computers and their role in the future were presented here at the recent National Computer Conference by researchers from the University of Southern California. The figures are dependent on how expensive hardware and especially software become, how much memory is available for personal systems, the extent to which software is precoded and how well it is developed, according to Jack M. Nilles, director of interdisciplinary programs at the university.

The preliminary report, partially supported by a grant from the National Science Foundation, will be published within a few weeks. A number of areas still to be covered will become part of the final report that will be released some time later this year.

Personal computing systems that will show the greatest growth will be those with 100K bytes or more of main memory. Demand for these systems will be strong past 1990, while sales of smaller systems will begin to level off, the researchers predicted.

If personal computers are to see use in networks, the cost of networking will have to be reduced considerably; digital sound hardware will need to undergo "substantial decreases" in cost before it can be used for recreational purposes, Nilles said.

The rate of growth for personal computing will remain slow through the mid-1980s, the

report said. It "will take that long for vendors to get their hardware and software technology together," Nilles explained. "Personal computing is riding the wave of development for larger machines, and the biggest barrier is software."

In addition to the 40 million systems predicted for installation in homes by 1997, more than 10 million systems will appear in large businesses, five million in small businesses and two million in learning institutions.

Businesses will benefit from computers because the systems will introduce an "expertise" by virtue of software's ability to organize records in a "better, careful" manner, Nilles said.

Some of the most intriguing questions addressed by the study will not appear until
(Continued on Page 62)

Micro-Based Aids for Disabled Shown

By Jay Woodruff
CW Staff

NEW YORK — A talking wheel chair, Telebraille and a line-of-gaze system were part of the "Personal Computers as an Aid to the Handicapped" session here at the recent National Computer Conference.

The day-long session, like many of NCC's personal computing sessions, was well-attended. Whenever a break was announced, the enthusiastic audience tried out some of the equipment and got the names and addresses of people whom they could contact for more information.

The talking wheel chair is a full-sized, motor-driven device with a CRT and computer-aided scanning system. It allows a severely handicapped person to construct sentences through the use of a single switch and play them through a Votrax ML-1 phone synthesizer.

The heart of the system is a microprocessor with 16K bytes of random-access memory, a minifloppy disk, a 5-in. CRT and the speech synthesizer. Power is supplied by a large 24V battery at the base of the chair.

The Versatile Portable Speech Prothesis (VPSP) needs more research and development on the way pages are laid out for the user to scan. Carol A. Simpson, one of the wheelchair's developers, explained. When the VPSP is ready, the National Aeronautics and Space Administration (Nasa), which funded the project through its Technology Utilization Program, will solicit manufacturers to construct the device.

Simpson, herself a former Nasa aircraft re-

searcher, said the VPSP would be of use to 1.5 million people in the U.S. with limited movement control and the inability to speak.

The retail cost of the system will be approximately \$9,800, including the Votrax,

'The system concentrates not on a person's disease or injury, but rather on building on the person's existing abilities.'

which is the most sophisticated model made at \$7,000. There are less expensive voice synthesizers available, but they lack some of the ML-1's sophisticated features, such as intonation to make the digitized speech sound more natural, Simpson said.

A demonstration of the talking wheel chair vividly brought home its possibilities when Jim Remmick, a severely disabled young man, played back a speech he had composed on the VPSP the day before. Remmick first saw the chair two days before, but constructed a two minute speech that described himself faster than he could have done it by other methods. Remmick is now in college and would like to earn a doctorate in nutrition.

Telephone Communications

Dr. Frederick Kruger demonstrated a prototype of Telebraille, which would allow deaf and blind persons to communicate over the telephone. Director of research at the Helen Keller National Center for Deaf-Blind

Youths and Adults at Sands Point, N.Y., Kruger said the machine can take braille transmissions, buffering them to any speed with which an individual is comfortable.

The unit has six keys, one for each dot in a braille "cell," plus a space key. When a user receives a call from another user, he places a finger over small metal base with six blunt pins. The message is read as the pins push up above the surface of the cell.

Other controls include a test mode with loopback and originate and answer mode.

Line-of-Gaze System

Richard A. Foulds, who worked with Randal W. Fincke at Tufts New England Medical Center on a computerized line-of-gaze system for rapid nonvocal communication for physically disabled persons, said their system could permit far faster communication than many previous methods.

Like others introduced at the session, the system concentrates not on a person's disease or injury, but rather on the person's existing abilities. If the person cannot type because of poor muscular control and if he cannot speak, a line-of-gaze system is one possibility that would still allow rapid communication, Foulds said.

With a Fairchild Corp. charge-coupled device, eye movements are tracked as the user looks at a special chart called an Etran Board. The board allows the user to start a word with a letter. Once the letter is picked, a computer shows the user a list of letters that could go with that letter, picked in order of the frequency in which they appear in the English language.

By narrowing the choice only to letters that could go with the letter or letters that have been picked, the user does not have to wait as long for the letter to come around. Foulds called this method of word construction the "anticipatory technique."

To keep memory requirements low, the machine will figure the next letter based on the last three letters of the word under construction. Eighty percent of the time, "that's as far as you have to go," Foulds said.

The center has spent \$10,000 on the system and is now testing it. "If it's a feasible system, it is probably something that could be produced for less," Foulds noted.

Speakers brought many other aids developed for handicapped persons, including a small wrist-worn typewriter with a thermal printer and a lap board that allows a person with severe motor skills impairment to move an object around the board, construct sentences on the board's LED readout and output the sentences through a voice synthesizer.

Package Lets 8080, Z80 Users Emulate 3780 Communications

FRIENDSVILLE, Md. — Micro-Integration, Inc. is offering a hardware/software high-speed binary synchronous communications package for S-100 bus microcomputers.

Bisynch/80-3780 provides IBM 3780 emulation for the 8080 or Z80, allowing communications between S-100 bus micros and other devices using the Binary Synchronous Communications (BSC) protocol. The package allows the user to go on-line to IBM mainframes or use their micros off-line for data preparation, a spokesman said.

Bisynch/80-3780 supports transmission and reception of data at speeds up to 4,800 bit/sec using a standard dial-up telephone line and modem, he added. The minimum hardware required is a 24K-byte S-100 bus

computer with a Z80 or 8080 microprocessor, at least one floppy disk and the CP/M operating system.

Data can be transmitted to the remote site directly from a standard CP/M file without preformatting, the spokesman noted. Data can also be received by a standard CP/M file or directed to a high-speed CP/M list device with no intermediate storage or reformatting of the data.

The package includes a synchronous I/O interface card that plugs into the S-100 unit, a cable that connects the I/O card to the telephone modem, the 3780 emulator program on floppy disk, complete documentation and a user manual for \$795. Micro-Integration is located at 104 Morris Ave., P.O. Box 335, Friendsville, Md. 21531.

Vector Graphic Systems Get Disk Doubled

WESTLAKE VILLAGE, Calif. — A 630,000-character dual floppy disk module to expand Vector Graphic, Inc. MZ and Memorite II systems from two disk drives to four has been introduced by that firm.

Called Micro-Stor, the module features two Micropolis Corp. MOD II quad-density disk drives using the standard 5.25-in., 16-sectored diskettes. The module can be plugged into the existing disk controller board for operation, the firm said.

The operating systems presently in use on Vector Graphic hardware were prepared in advance to accommodate four drives. The Micro-Stor costs \$1,395 from the firm at 31364 Via Colinas, Westlake Village, Calif. 91361.

Three for Self-Study Seven Courses on Micros Ready

SANTA MONICA, Calif. — Integrated Computer Systems, Inc., a company specializing in advanced technical education, has added seven microcomputer courses to its curriculum.

The courses include three hands-on, self-study courses and four classroom-style courses. The hands-on courses include 525A, which covers microprocessor programming and hardware design; Course 536A, covering

microcomputing interfacing; and Course 565, microcomputer development systems.

The classroom-style courses include Course 160, a microprocessor hands-on workshop; Course 142 on troubleshooting microprocessor-based systems; Course 203, covering military and aero-

space microprocessor systems; and Course 240, which covers small systems for business, industrial and scientific applications.

More information is available from Integrated Computer Systems at 3304 Pico Blvd., P.O. Box 5339, Santa Monica, Calif. 90405.

Micro-Based Devices Help Handicapped Communicate

(Continued from Page 61)
the final report, but Nilles indicated in detail what is planned.

Privacy Addressed

The right to privacy is one policy issue the final report will address. Because businesses and government are expected to utilize much personal information, there is the worry that the information could be transferred to data bases that have no right to that information. The right to privacy could be protected by requiring computers to offload their data to a citizen's personal computer to give the person some control over who has that information.

Will personal computing "homogenize" society or "be an agent for greater diversification"? Will it offer more personal freedom or less? Nilles indicated that people working on the project tend to think many tasks of personal drudgery will be eliminated by personal computing, which could promote diversification.

The study will also look at personal computing's effect on education. There is a possibility that private schools, with less rigid curriculum guidelines, may provide better education than public schools through special course offerings and the use of personal computing, Nilles said.

Negative Forces

The computer as a force toward social stratification is another area the study plans to probe. It is possible that the use of personal computers by people in the middle and upper classes who can afford the systems may further block less privileged persons from taking advantage of computing power, he said.

"How do you change the educational system to give underprivileged classes functional literacy with computers?" he asked. To cope with the need for education, a "second industry of education for computers" may be formed.

Although the competition among personal computer manufacturers is diverse, the researchers think one firm will become "the IBM of personal

computing," Nilles said. Even though Tandy Corp. is a personal computing giant, it employs only "a couple of hundred people," so there is a chance its position in the marketplace could change, he reminded session participants.

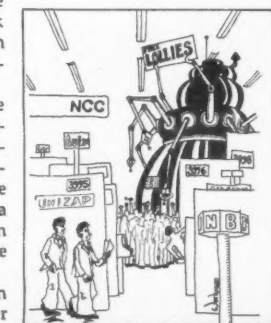
The University of Southern California study will also look at the effect personal computing will have on recreational habits. Specifically, it will address the 20 hours that most people watch television each week. Nilles indicated that an increased use of personal computing systems "could change the broadcast industry."

Telephone Bottleneck

Personal computer users could create bottlenecks in telephone exchanges, Nilles suggested. "It could be a problem if exchanges — especially electronic switched systems — were used by groups of users all at once," he said, adding that older crossbar switching systems would be less affected by such heavy usage.

To solve the problem, the phone company would have to determine who should bear the cost of eliminating the problem — all telephone subscribers or those who created the problem. The most feasible "near-term fix" might be to charge each user for the amount of time the telephone system is used for personal computing, he said.

The future of personal computing is difficult to predict, Nilles said, because there are so many variables. As a result, the final report of the study will present a number of alternative scenarios.



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Different Paths to Technology STC, Intel Show Semiconductor Disks

By Marcia Blumenthal

CW Staff

NEW YORK — While both Storage Technology Corp. (STC) and Intel Corp. recently introduced storage subsystems that create a totally new memory layer between main memory and fixed-head disk storage, the two companies have taken different routes to the technology employed in the products.

Shown publicly for the first time at the recent National Computer Conference here, the STC 4305 solid-state disk uses semiconductor charge-coupled devices (CCD), whereas Intel's Fast-3805 disk system employs traditional 16K-bit random-access memory (RAM) technology.

Although these systems offer markedly improved access times, they are not expected to replace fixed-head disk storage because the semiconductor devices used in the products are volatile.

Designed primarily as virtual paging devices for IBM systems at the 370/158 power level and above, the STC 4305 and the Intel 3805 are considered by the companies as adjuncts to rather than replacements of the storage devices presently available.

Supply Problems

STC chose CCD technology because it could not build a cost-effective product using 16K RAMs, according to Thomas D. Purtell, director of disk programs, at STC. Other possible devices such as bubble memory or 64K RAMs are not widely available,

nor are they inexpensive.

Yet CCDs are also in short supply. Fairchild Camera and Instrument Corp. and Texas Instruments, Inc. are the only companies now producing them in commercial quantities. "CCDs will maintain a better price if our suppliers continue to manufacture them in the quantities we need," Purtell noted.

Purtell said STC has sold all the 4305s it can build through the first part of next year and has commitments from suppliers for all the CCDs needed for these orders.

The basic problem is getting suppliers to increase their production of CCDs, Gary M. Holtwick, director of storage system products, explained. "Suppliers may not have the demand for CCDs that would make it attractive for them to increase the supply."

Rumors abound that IBM is planning to use CCDs in its H series of mainframes, expected to be introduced early next year, and that TI may be planning a deal with IBM to supply it with CCDs. TI's continued ability to supply CCDs to STC is softer than Fairchild's, the two STC managers agreed.

Although Fairchild is about three months behind TI in supplying CCDs, STC has a commitment from Fairchild for all the CCDs it needs to fulfill customer requirements for the next year, Purtell disclosed.

TI and Fairchild CCDs can be used together in a single 4305, but STC, for maintenance purposes, does not want to build both

devices into a single unit. This appears to limit its production even further if the supply of CCDs from either company decreases.

Corralling RAMs

STC thinks it has an advantage over Intel's 3805 because of the company's forte in control unit circuitry. Moreover, Purtell noted that 16K RAMs are also in short supply at the moment. IBM is said to be buying 16K RAMs from suppliers, including Intel, in enormous quantities.

As a manufacturer of 16K RAM devices, Intel has not had a problem supplying the devices for its in-house production of the 3805, according to Stephen G. Maysonave, business planning manager for Intel. Moreover, Intel has several second sources for semiconductor devices that STC does not have, Maysonave pointed out.

Although Intel is new to selling system-oriented products, its salespeople have had experience selling systems, Maysonave noted. Some training was needed to familiarize the sales force with the software and microcode features not found in Intel's usual memory products.

Intel originally explored the possibility of producing the semiconductor disk product four years ago, but 4K RAMs and 16K CCDs were not cost-effective, Maysonave said. Moreover, IBM's OS/MVS was not working that well.

While Maysonave does not expect IBM to offer a similar product for its 370 or 30 series, he does expect IBM to incorporate some kind of hierarchical storage device in its H series. "But instead of attaching it to the channel, IBM will put it under the skins," he forecast.

With an access time of .4 msec, Intel claims a 43% minimum advantage over STC's average access speed of .7 msec. Intel said that its 3805 can get to information 12 times faster than standard fixed-head gear.

STC's access time could be longer than .7 msec, perhaps even reaching 1.4 msec, Maysonave pointed out, adding that RAMs are truly random-access with fixed times, whereas CCDs access information serially, much like bubbles.

Built into the 3805 is a 15% to 20% spare memory capacity and an on-board maintenance feature which, in the event of a failure, permits the system to move data into a spare storage area and record that transaction for the field service engineer.

Intel is now exploring the feasibility of using a 64K RAM for the system, but Maysonave said he was not at liberty to discuss the details of the in-house project.

Independent Component Makers Seen Neglecting Customization

By Marcy Rosenberg

CW Staff

NEW YORK — The semiconductor industry has neglected the custom component requirements of its users.

Independent components manufacturers "tend to design devices within the limitations of technology, assembled in conventional packages," Dr. Gordon Moore, Intel Corp. chairman, told members of the Computer & Communications Industry Association (CCIA) at its quarterly membership meeting here last week.

Independent industry suppliers have overlooked what Moore termed a "significant" need for products where architecture comes before technology, to preserve, for example, an existing software base. As a result, "our industry is not supporting custom design very well."

To fill this gap in user support, Moore predicted a continued proliferation within user organizations of captive semiconductor production facilities as technology becomes more widespread. But the captive solution is not without its drawbacks.

One problem faced by captive semiconductor houses is the high cost of operating. And these costs, Moore noted, "often get hidden in a captive facility."

Another fly in the ointment is the scarcity of skilled design engineers. In addition to being in short supply, these professionals tend to prefer to link up with independent components manufacturers in the mainstream rather than to join captive suppliers, he explained.

In addition, a captive semiconductor operation leaves itself especially vulnerable to barking up the wrong technological tree. Even in independent firms, Moore said, taking the wrong technological direction can affect the future of the whole company.

"And an in-house facility, unless it is very careful, has the distinct possibility of going up the wrong alley — usually a blind one."

Other avenues the user can explore to find support for his unique requirements, according to Moore, include:

- Contracting with custom circuit vendors.

- Taking the "silicon foundry" approach, in which the user controls and designs his own circuits but leaves manufacturing to an outside vendor.

- Taking the approach in which the user's in-house semiconductor facility manufactures the circuits from designs provided by an independent semiconductor house.

The merits of these options can be debated. Custom circuit vendors, for example, often provide "ultraconservative" designs using

(Continued on Page 64)

AT&T Exec Draws Fire

By Marcia Blumenthal

CW Staff

NEW YORK — "I regret coming here," Thomas E. Bolger, executive vice-president of AT&T, exclaimed after he took 20 minutes of needling from members of the Computer & Communications Industry Association (CCIA).

Bolger had agreed to speak to the CCIA in an attempt to solidify AT&T's commitment to provide communications and other DP services in a competitive environment.

Reading a carefully prepared, noncommittal speech from which he did not deviate, Bolger told CCIA members that it is AT&T's policy to "conform to the highest ethical standards" and that the company

and each of its subsidiaries would "comply with the letter and the spirit of applicable laws and regulations."

After concluding his remarks, Bolger agreed to answer questions, and that was when the fireworks started. Bolger was particularly unnerved by CCIA members who pressed him on the issue of creating a separate subsidiary for the competitive portion of the company's business.

The major problem is determining what constitutes the monopoly part and what the competitive part of the business: "We know how to gather the costs [of services and products], but we don't know how to divide up the operation of a jointly used service," Bolger said.

(Continued on Page 64)

AT&T's Bolger Draws Fire at CCIA Meeting

(Continued from Page 63)

Agreeing with CCIA's stand that cross-subsidies between the regulated monopoly and competitive portions of the company's business are not in the public interest, Bolger noted that, in the past, AT&T's cross-subsidies have never been found to be against

the public interest.

"We clearly feel that the separate subsidy concept is not necessarily an effective substitute for an accounting system in reducing the possibility of a cross-subsidy," he emphasized.

AT&T is currently developing a comprehensive cost-

accounting system that will reportedly safeguard against the incidence of cross-subsidies.

CCIA members did not seem to believe that AT&T lacked the knowledge to divide up its business.

In response to a question posed by Dr. Lawrence Roberts, chairman of Telenet Communications Corp., referring to the way AT&T would handle its Advanced Communications Service (ACS), Bolger pointed out that General Telephone and Electronics Corp. and Telenet haven't looked upon separation favorably. "The parent corporation cannot just be a banker," Bolger said.

ACS will not be an end-to-end service with local loops, he explained. Rather, access to

ACS nodes will be through Bell carriers, and since the service would be covered under interstate access tariffs, the costs would be known.

In response to a question on AT&T's Unix software package, Bolger said he appreciated the feeling of CCIA members that the software should be licensed to the industry at large, rather than sold by AT&T directly to users. However, AT&T will not change its competitive posture on selling Unix, Bolger stated.

"But I think it's important that you understand the basis on which we make available software packages that have been developed for our internal use. Generally, these packages are useful to sophisticated DP organizations only because we provide no main-

tenance, support or updates," he added.

Bolger noted that many companies have taken sublicensing rights to Unix and built successful business ventures by offering "supported Unix service."

As the question and answer session became more heated, CCIA President A.G.W. (Jack) Biddle stepped in to adjourn the proceedings. However, an offhand remark Biddle made indicating that if he were in AT&T's shoes he would want to take care of his own before being nice to anyone else seemed to further incense Bolger.

The consensus of CCIA members discussing the incident after the breakup of the meeting seemed to be, "What did [Bolger] expect?"

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Semi Industry Held Neglectful

(Continued from Page 63)

"obsolescent" technology in order to minimize design costs, Moore said.

What is Intel's role in custom circuit design? "We do it every couple of years to convince ourselves of how poor we are at doing it," he quipped.

As for users leaving circuit design to outside semiconductor manufacturers while shouldering the task of manufacturing, Moore said simply, "That's absurd — although it may protect the user's source of supply."

'Silicon Foundry'

Instead, Moore predicted a possible trend toward the "silicon foundry" concept because it gives the user control over his circuit designs, but relieves him of the burden of high-technology manufacturing.

However, this approach carries certain risks as well. First, it locks the user into an intimate relationship with a single supply source, he said, noting "second-sourcing at the leading edge is impossible."

Further, this relationship can easily switch to a "finger-pointing mode," where each party blames the other for a device malfunction. And if a design doesn't work, the user must be prepared to debug, modify and redo his design, a procedure that usually occurs three to 10 times during the production cycle, Moore pointed out.

He added that, from the independent's point of view, this kind of business relationship also requires an adjustment. From handling large-volume standard device production, the independent must go to working with small quantities of "specials."

Therefore, in order to marry an in-house systems man to

leading-edge semiconductor technology through the "silicon foundry" concept, certain ground rules must be established. From Intel's perspective, the user must agree to allow the independent semiconductor manufacturer to process a minimum number of wafers on the production line,

therefore running the risk of overkill.

The user should also be prepared to make a fairly long-term commitment to the vendor, to agree to give the vendor some standard business on the side and to accept the vendor's wafer price, Moore said.

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Lawyers Agree: Software Lacks Universal Means of Protection

By Marcy Rosenberg

CW Staff

NEW YORK — There remains today no "universally acceptable" means of protecting proprietary software.

This is true even though the investment in software makes it more valuable than computer hardware, according to Roger L. Milgrim, attorney and senior partner at Milgrim, Thomaja, Jacobs & Lee, a law firm here.

Milgrim was one of three panelists in a session of the recent National Computer Conference exploring the legal protection of software available today, notably trade secret, copyright and patent protection.

Considering the current state of the law, Milgrim said, trade secret protection for software would be desirable, primarily because such protection is presently enjoying "a favorable judicial climate."

For example, the Supreme Court recently granted the licensor of trade secret information the right to require the licensee to pay licensing fees "forever," even after the secrecy surrounding such information vanishes, Milgrim said. He contrasted this benefit to a limitation under the patent system that allows the patent holder to extract royalties for the duration of the patent only.

In addition, the Supreme Court ruled recently that trade secret laws can protect information supplied to government agencies. This ruling gave individuals supplying confidential information to the government the right to prevent the receiving agency from disclosing such information to private parties.

Universal Applicability

A further advantage to trade secret protection lies in its universal applicability. According to Milgrim, "every civilized country in the world" recognizes trade secret protection and its legal application to any kind of information used in one's business, any information not generally known in that business and information lending one's business a competitive edge.

By comparison, U.S. software patents give competitors abroad a "free ride," he remarked, because not only do very few countries recognize them, but in addition, U.S. patent law requires full disclosure of the protected information.

In other respects, however, Milgrim called trade secret protection "puny" compared with patent rights because two or more individuals who independently develop the same information receive equal protection and become trade secret licensors. Typically, "you can have three, five or even 10 independent owners of a trade secret, each substantially identifiable to the next," he noted.

In addition, to realize adequate protection under trade secret law requires the owner to maintain internal safeguards in the form of contracts or restrictive covenants to prevent or limit disclosure of trade secret information.

Despite its drawbacks, however, trade secret law remains the best vehicle for protecting software, largely because patent and copyright laws limit the degree to which software can be protected, Milgrim maintained.

Agreeing that patent law is fuzzy when it comes to software protection was Allan M. Lowe, patent attorney and senior partner at Lowe, King, Price & Becker of Arlington, Va.

Since the middle of the 19th century, patent law has held that protection cannot extend to the laws of nature or mathematics "because they always existed — it was just up to man to find them," Lowe explained. Only recently have machines, based on the laws of nature and mathematics, been deemed patentable, he added.

Today, "new" and "unobvious" are the key words that determine which hardware and software configurations can be patented, Lowe explained. Eligi-

ble for patent protection, then, are new and unobvious computer programs controlled by a programmed CPU, disk or bubble memory and peripherals, such as multiple program control computers.

New and unobvious external devices controlled by computer programs can be patented, regardless of the program that controls them.

'Old,' 'Obvious' Won't Pass

On the other hand, neither old nor obvious computer combinations of hardware and software nor algorithms per se can form the basis for a patent application, even if the algorithms are unobvious, he said.

And then there are the gray areas where eligibility for patent protection remain unresolved. Lowe cited the example of old or obvious combinations of computer components run by a computer program in an unobvious manner.

The result is that three judicial bodies — the Court of Customs and Patent Appeals (CCPA), the U.S. Patent Office and the Supreme Court — continue to lock horns on the issue of patent protection for software.

In several cases, for example, the CCPA deemed patentable old or obvious computer programs that in combination with old or obvious hardware produced new physical results.

The Nodes Know.

Find out how much in our July 30th Special Report on *Distributed Processing*. As the cost of communication goes up and the price of hardware goes down, are minicomputers in a distributed network a more desirable alternative? Is distributed data processing the new wave of the future? Here are some of the issues we'll be taking a look at in this Special Report:

- When does an organization go to a DDP network?
- How can the change take place cost effectively and with a minimum of disruption to the organization?
- What are the potential drawbacks of having more intelligence and autonomy in the field?

Edited by Brad Schultz, this Special Report will provide answers to these questions along with a discussion of the profound impact DDP is having today on the internal operations of large organizations.

If you're a user who watches the trends, you'll want to have the most up-to-date information about DDP and you'll find it in our July 30th report. Closing date is July 13th.

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Contracts

Megatek Corp. has signed an OEM contract with Scientific Calculations, Inc. calling for a minimum delivery of 25 of the firm's Whizzard 7000 vector refresh graphics terminals. The contract is valued at approximately \$1 million over a year's period.

Systems Designers Ltd. has been awarded a long-term contract to set up the Systems Division of Insac's International View Data Centre.

Honeywell, Inc. has obtained a contract from American Express International Banking Corp. for 17 to 24 Level 6 Model 43 minicomputers. The order's hardware value ranges from \$3 million to \$6 million.

Pertec Computer Corp. has been

awarded a contract for more than \$850,000 by Western Peripherals, Inc. Under the terms of the two-year contract, Pertec models T6000, T7000, T8000, T9000 and T1000 tape drives and Pertec models D3000 and D3000 extension disk drives will be used as peripheral add-ons for minicomputers.

Leeds & Northrup Co. has been awarded a \$27.6 million contract for instrumentation and systems for a new fossil fuel power-generating facility by the State Electricity Commission of Victoria, Australia.

Pertec Computer Corp.'s Peripherals Division has been awarded a contract for flexible disk drives totaling more than \$600,000 by Realizations Etudes Electroniques of America, Inc.

December Show to Be First To Focus on Dealers, Reps

FRAMINGHAM, Mass.— A new show will enter the conference circuit later this year to help computer equipment manufacturers connect with dealers, distributors and reps to spark new marketing relationships.

Slated for Dec. 3-5 at the MGM Grand Hotel, in Las Vegas, the Comdex '79 conference and exposition is open to any third-party vendor interested in solidifying existing relationships or investigating the potential for acquiring additional lines.

Exhibitors are expected to include manufacturers that sell computer systems, peripherals, software packages, word processing systems and media through independent third-party sales

organizations running the gamut from distributors and dealers to systems houses, turnkey vendors, value-added houses, commercial OEMs and manufacturers' reps.

"Manufacturers tell us their biggest problem today is developing effective sales representation," observed Sheldon Adelson, president of The Interface Group, Comdex's sponsor.

Filling a Void

According to Adelson, no computer-related trade show specifically addresses the needs of distributors, dealers or reps, either on the exhibit floor or in conference sessions.

This is a void Comdex hopes to fill. The show will provide a comprehensive conference program focusing on solutions to business problems normally encountered in structuring a successful dealership and on the operational aspects of the dealership from both the supplier's and customer's viewpoints.

Exhibit Space Short

Noting that the exhibit space for Comdex is limited to a 50,000 square-foot hall, Adelson said exhibitors will be assigned booth space on a first come, first served basis.

More information on the conference is available from Peter Young, program coordinator at The Interface Group, 160 Speen St., Framingham, Mass. 01701.

UK Trade Show Begins Oct. 23

WASHINGTON, D.C. — The UK's 1979 International Business Show will be held in Birmingham, England, from Oct. 23 to Nov. 1.

One of the UK's oldest trade shows, the event is being promoted in the U.S. for the first time. More than 300 exhibitors are expected to show their wares at Birmingham's National Exhibition Center.

Further information on the show, which is sponsored by the Business Equipment Trade Association in the UK, may be obtained from Trade Fair Exhibitions/British Airways, Suite 1002, 1625 Eye St. N.W., Washington, D.C. 20006.

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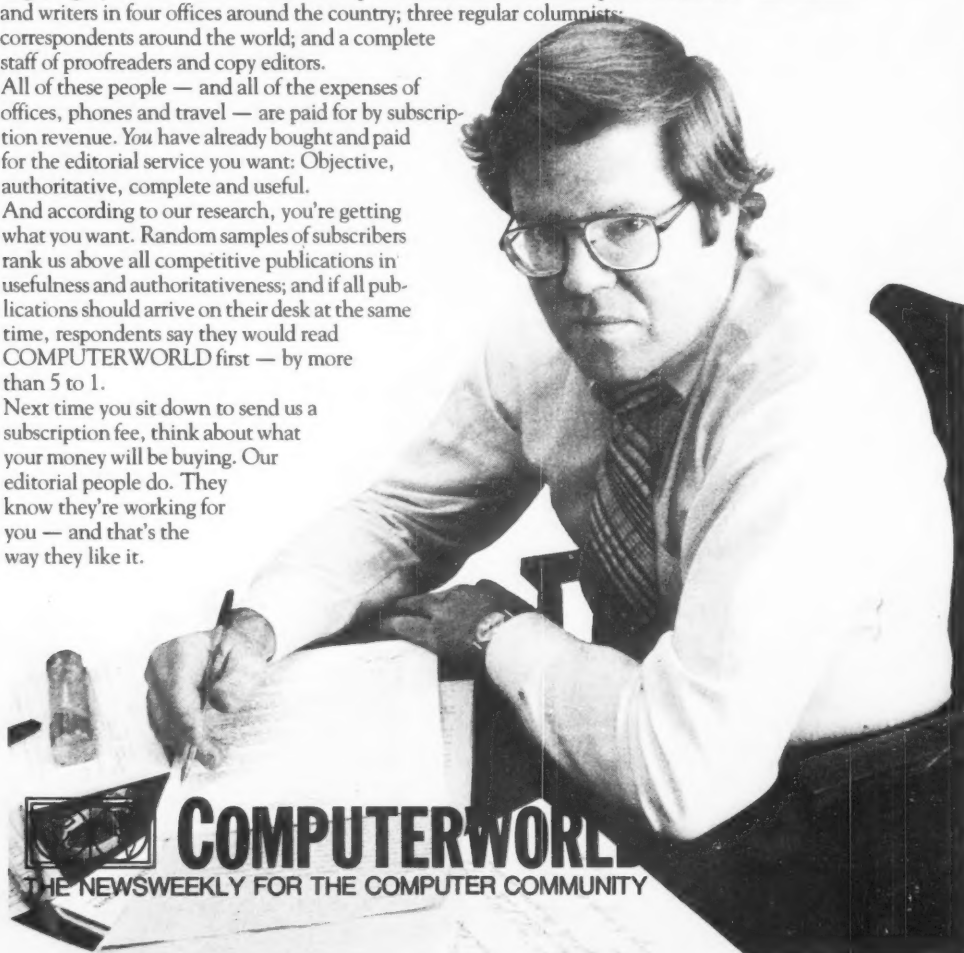
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DDS Seen Threatening Modem Suppliers

By Marcy Rosenberg

CW Staff

SAN JOSE, Calif. — Wider use of AT&T's Dataphone Digital Service (DDS) — which would theoretically eliminate the need for digital-to-analog conversions — poses a threat to independent suppliers of modems and multiplexers.

However, DDS will not significantly impact these markets for at least five years, according to a report by Creative Strategies International (CSI) here.

Despite the Bell System's goal of implementing DDS in 96 major U.S. cities by 1990, CSI noted Federal Communications Commission (FCC) tariff restrictions have kept Bell from actively pushing the service. And even when Bell irons out its problems, multiplexers will still have the capability to interface with DDS to multiplex several analog lines for long-distance digital transmission, the report stated.

Market to Triple?

Meanwhile, increasing demand for high-speed, high-volume data transmission and improved price/performance ratios of modems and multiplexers will fuel continued growth for both markets, CSI said.

Since the 1966 Carterfone decision paved the way for independent manufacturers to crack Bell's monopoly of the modem market, these suppliers have created a \$280 million worldwide market that promises to triple to \$885 million by 1983, a 25.9% compound annual growth rate, according to CSI.

Further, CSI forecast that the worldwide installed base of modems manufactured by U.S. firms will grow at a 25.6% compound annual rate from 1.7 million units last year to 5.4 million installations over the five-year period.

The advent of the intelligent, or statistical, multiplexer will propel multiplexer sales to \$193 million in 1983, a 34.7% compounded yearly increase from \$43.5 million in 1978. Similarly, the 1978 installed base of 35,000 units will jump to 145,000 by 1983, an increase of 32.9% compounded annually.

Despite bullish market predictions, competition in the

areas of sales and service capabilities, capital and uniqueness of product will gain momentum to block new entrants and spark acquisitions.

Last year, for example, Racal Corp. bought Vadic Corp. and Motorola, Inc. acquired Universal Data Systems, the report pointed out. CSI also noted that out of the 200 independent manufacturers that flooded the modem/multiplexer business following the

Carterfone decision, fewer than 50 true suppliers remain.

Bowing to competitive pressures and recognizing the market potential for statistical multiplexers, many modem makers are diversifying into this line. The report cited as examples Gandalf Data, Inc. and Prentice Electronics Corp., each of which plan to introduce a statistical multiplexer product this year.

The current statistical multi-

plexer market is expected to balloon at a 100% compounded yearly rate, according to CSI. By using microprocessors, these units can detect and correct errors, compress data and detect speeds — capabilities not available with traditional time division multiplexers.

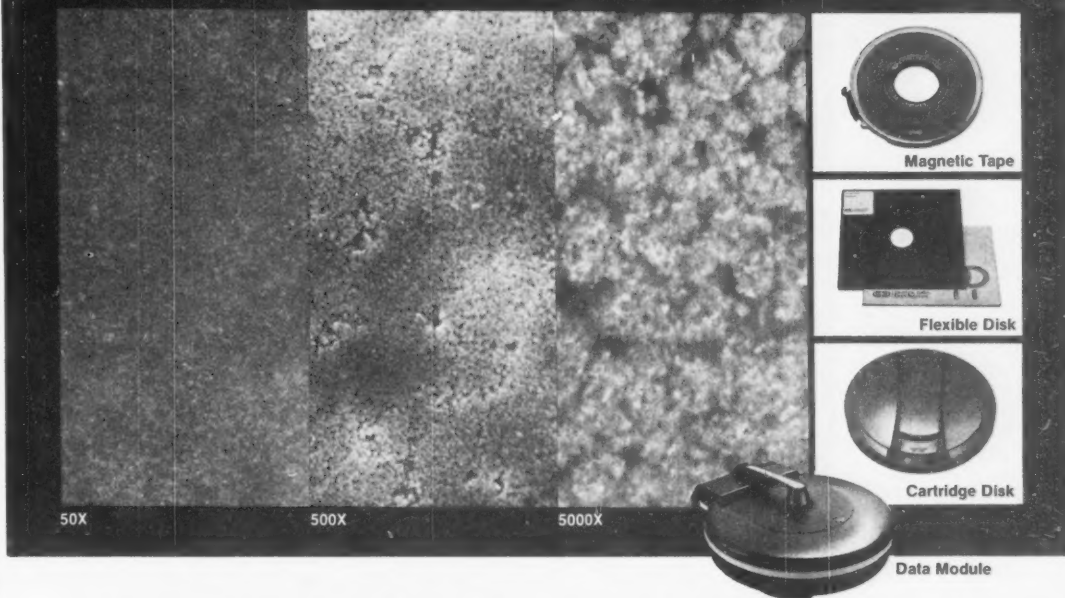
Microprocessor technology also improved the diagnostic capabilities of modems which, along with network control

systems, give users the indicators necessary to monitor their data communications.

Because of a growing demand for high-speed data transmission, the report forecast major growth through 1983 for medium- and high-speed modems.

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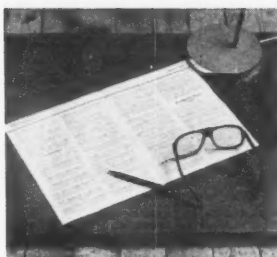
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For fifteen years, E. P. Reardon Associates has been placing professionals in better, more rewarding positions in New England and around the U.S. You can rely on us to handle your resume with discretion and in a professional and confidential manner. We're proud of the fact that most of our placements come as the result of referrals from satisfied clients. New openings come to our attention daily from companies large and small, in the design and manufacture of minicomputers/microprocessors, peripherals, process control equipment, medical instrumentation, software consulting, military electronics, and many others. Knowing where the openings are has made us and kept us one of the leading Professional Placement Consultants in New England. For those wishing to locate outside New England, we are part of the National Personnel Consultants network of over 100 independently owned agencies covering the entire country.

This is a partial list of available engineering openings representing just a few of the outstanding positions currently available with client companies.

SOFTWARE TECHNICAL WRITERS

To 28K

Rapidly growing commercial division of Fortune 100 company engaged in design and manufacture of intelligent terminals, stand-alone minis and data communications equipment. You will be involved in writing user manuals, systems documentation and marketing literature. Programming experience plus demonstrated writing skills are essential.

DATA COMMUNICATIONS

20-26K

Newly opened facility for research and development. This modern building houses the engineering teams designing the latest equipment for high speed data communications. Your experience with protocols, drivers and packet switching is in demand as this company seeks to add significantly to their software staff. Suburban location assures pleasant, short commute.

If you're considering a career advancement move at this time, send your resume to Dan Meagher, today, or call him collect at 617-329-2660.

SR. SOFTWARE SYSTEMS ENGINEERS (3)

To 32K

These newly created positions are designed to add substantial depth to the software development capability of this industry leader. The individuals selected will participate as senior members of the software and systems development organization and will act as technical leaders in data communications, operating systems, or diagnostics. You will be responsible for initiating software systems design concepts for product architecture and influence decisions at both the product design and planning levels.

SOFTWARE SYSTEMS PROGRAMMERS

24-32K

Blue chip consumer products company currently undergoing major expansion in the real-time industrial controls area. These are ground floor opportunities to be involved in all phases of minicomputer industrial control system design and implementation. Facility is ideally located in low cost of living area accessible to some of the finest recreational facilities in all of New England.

SOFTWARE ENGINEER

20-24K

Minicomputer manufacturer, division of Fortune 100 company.

Assignment in Advanced Development will involve you in the detailed design, coding and debugging of system generation, initialization and recovery procedures in an on-line, multiprocessing transaction oriented system. Liberal employee benefits package including generous education reimbursement.

SOFTWARE SUPPORT

To 26K

An unusual position offering extensive travel throughout North America. After a period of formal training at company headquarters you will be the lead person responsible for solution of software problems at the customer site. An in-depth technical (minicomputer) background is important as is the ability to work independently. Good communication skills are essential.



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BAI Limited is not an employment agency. We are Recruiting Consultants who specialize strictly in Data Processing Placement. Our clients pay all fees and expenses. To explore the EDP market professionally, confidentially, and effectively, call:

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(404) 581-0040

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These positions are for Dallas, Atlanta, Houston, Phoenix, San Francisco, and some cities of 100,000. Please send a resume or letter of interest. We will return pertinent information on your geographic preferences.

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(214) 692-7781

P.S. We have permanent and contract-hire long term consulting positions available for OS, COBOL, and/or data base professionals. If you've ever wondered what TRUE consulting is all about, please contact us! Top financial remuneration package.

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Professional systems person to assist in developing integrated on-line library catalogs in the Southwest. Applicant must have a solid technical background in systems analysis and programming. Prefer experience in manipulating library bibliographic data, e.g. MARC format, and in online system design and development. Applicant must be able to present concepts clearly both in oral and written form to non-technical individuals and be willing to write programs and expand tape management and COM catalog systems. Some travel may be required. Liberal fringe benefits: 3 weeks annual vacation, 14 paid holidays, paid employee insurance (TIAA/CREF). Send resume, salary requirements, and references to:

James H. Kennedy
Executive Director
AMIGOS Bibliographic
Council, Inc.
11300 North Central
Suite 321
Dallas, Texas 75243.
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Programmer/Analyst Savings and Loan Data Corp.

The Savings and Loan Data Corporation is a company owned by 205 Savings and Loan Associations which are located throughout a broad ten state area. Our employees are dedicated to providing on-line EDP services to our shareholders. We are seeking energetic and well-qualified individuals to join our systems and programming staff. Experience with COBOL is a must; exposure to financial applications is a plus. If interested, please telephone or forward your resume to:

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Savings And Loan Data Corp.
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Software Engineers Telecommunication System Engineers

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Is responsible for significant development tasks critical to this program.

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GTE has annual revenues approaching \$10 Billion and is the largest independent (non-Bell) telephone company in the U.S. Atlantic Operation, although it provides an important element of service within GTE, numbers less than one hundred employees and is in a rapid growth mode. You can grow along with it.

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Our salary structure and fringe benefits compare favorably with the best in the industry.

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We recognize the benefits to you, and to us, of advanced education and have established programs to assist you in pursuing this education. We offer an in-house program in cooperation with Boston University leading to a Masters Degree in Computer Science. We also offer in-house, state-of-the-art

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Full Time/Part Time Working Hours

Have a family or personal commitments prevented you from pursuing a full time career? At Atlantic Operation, you can capitalize on your education and training by working part time.

Sound interesting? Maybe you want to talk further. Call Fred B. Brown, Area code (617) 890-9200 Extension 621 collect, or send a resume to him at:

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Salary commensurate with qualifications and experience. Send resume to Mark Grove, Recruiting Office, Aetna Life & Casualty, 79 Farmington Avenue, Hartford, CT 06156. An equal opportunity employer. (No agencies please.)


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Matson Navigation Company, a worldwide leader in ocean transportation, is meeting the challenges of the future with a revolutionary concept in computer assisted container handling. Due to the dynamic potential offered by our new system we are expanding our data processing capabilities to OS/VS1, CICS/VS, DL/I, VM/370 & CMS on a large IBM 370 mainframe, linked to distributed IBM Series 1 minicomputers. This pioneering expansion has created several challenging career openings for computer professionals.

Manager On-line Data Base Systems

Exciting opportunity to direct the design and development of a new CICS/DLI DB/COBOL oriented Management Information System used in a large-scale transportation network. You will administer a staff of analysts, programmers and support staff and provide consulting/advisory services on online Data Base Systems. Requirements for this position include a Bachelor's degree, preferably in computer science, business or mathematics; 6-10 years of progressively responsible experience in data processing; and at least 2 years' experience as project manager in charge of significant MIS development. Working experience with OS/VS1, CICS/VS, and DLI is desirable.

Manager Systems Development

Challenging opportunity to direct systems development activities including systems analysis, systems design, and programming. Responsibilities will include overseeing large scale projects for development or major modification of information systems, from concept to full operation. In addition, you will plan and administer a staff of analysts and programmers, and furnish planning, consultation and advisory service on systems development. Requirements for this position include a Bachelor's degree, preferably in mathematics, computer science or business; 6-8 years' experience in data processing with demonstrated project management ability in a variety of application areas; at least 2 years' experience as a Development Manager; and previous training in management practices, administrative management, project control, analysis and design techniques, and planning. Working experience with OS/VS1, CICS/VS, DL/I, DOS/VS is necessary; familiarity with structured design desirable.

Systems Programmer

Position will support IBM 370/148 system control programs for Data System development activities. Responsibilities will include the generation, installation, maintenance, and fine tuning of Data Systems; technical training of personnel; and assisting Computer Center users. You will also be involved with trouble-shooting on-line systems. Requirements for this position include a Bachelor's degree, preferably in computer science or mathematics, or equivalent experience, and 3-5 years' system programming experience in OS/VS1 internals and system generation. Working experience with VM/370, CICS/VS, DL/I, and DOS/VS desirable.

Senior Programmer Analyst On-line Systems

Challenging involvement in a team-oriented environment to design On-line Data Base Systems and to be responsible for development teams during implementation processes. Requirements for this position include a Bachelor's degree, preferably in computer science, business, engineering or mathematics; 5-7 years of progressively responsible experience in data processing design and programming; and at least two years' experience as a team leader responsible for MIS development. Working experience with OS/VS1, CICS/VS and DL/I is highly desirable.

Systems Analyst

Growth-oriented position to develop a new IMS/CICS/COBOL Data Base system. This position offers an outstanding opportunity for learning structured systems design and structured programming skills. Requirements for this position include college level education related to systems analysis and a minimum of 4 years' related experience with 2 years as a systems analyst.

In addition to excellent working conditions, you will receive a generous starting salary and be part of Matson's outstanding fringe benefit program. For immediate consideration, please submit your resume and salary requirements to M.A. Dineen, Matson Navigation Co., P.O. Box 3933, San Francisco, CA 94119.



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Think about the interesting job, the extra income and the travel opportunities available in Saudi Arabia. And about the opportunities for career development if you work for Aramco in the U.S. If you're interested, call Jerry Hollingshead for an application, or send your résumé in confidence to: Aramco Services Company, Department CW061879A, 1100 Milam Building, Houston, Texas 77002. Call toll-free: 1-800-231-7577, ext. 4114. In Texas, call collect: (713) 651-4114.



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DIACON

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PROGRAMMERS OVERSEAS EMPLOYMENT

EDP-Software Systems Specialist

Degree required plus a minimum (5) years experience in software support. In-depth experience with CICS/VS, DOS/VS, VSAM and POWER/VS on IBM 370 including operation system generation and maintenance. CICS software implementation, maintenance and system tuning, technical advice to applications programmers. Our System is comprised of IBM 370/135-512K core, disk and tape peripherals, terminals 3720 series. Languages ANS/COBOL, MARK IV, FORTRAN and ASSEMBLER.

EDP-Advanced Systems Analyst

Degree required plus a minimum of (5) years of progressive experience in system design/analysis and computer programming. An advanced knowledge of COBOL, preferably on IBM S/370 plus a knowledge of MARK IV, 370 ASSEMBLER, DOS/VS and POWER very desirable.

Salaries commensurate with experience, plus generous overseas premium, plus an extremely attractive savings plan and other benefits. Family residence, plus 30 days annual vacation and an excellent opportunity to travel and save money.

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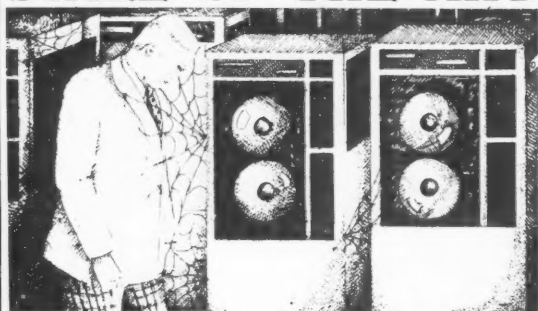
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Real Time Software System Designers, Analysts and Programmers for projects including executive and applications software/firmware within distributed mini/microprocessor and signal processing systems. System simulation and modeling software expertise also required. B.S. or equivalent in Math, Physics, EE or Computer Science, experience in mini/micro assembly languages and/or HOL (FORTRAN, JOVIAL, PASCAL, CMS-2, . . .) preferred.

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Candidate must be thoroughly versed in the bit slice and monolithic 8 & 16 bit microprocessors. A minimum of three to five years experience in the writing of firmware is required. Experience in modular top down structured programming desirable. A background in digital hardware design is preferred.

For consideration forward your resume to: Ron Nowfel,
Harris Corporation, Government Information Systems Division,
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Analyst and Programming Opportunities in a University Environment

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Financial Analyst needed to work in a non-profit organization. Three to five years experience in Accounting, Budget, and Investments as related to computer systems desirable, along with an in-depth knowledge of two major programming languages. Familiarity with IBM hardware and software is a definite plus. Systems design experience is a must, preferably in an educational institution. Salary in the low to mid 20's.

Systems Analyst needed to work with and develop on-line college and university systems. A Computer Science background is desirable, along with previous experience in two major programming languages. Familiarity with IBM hardware and software, commercial applications and data base concepts, is a definite plus. Three or more years of system experience is a must. Salary in the low to mid 20's.

Applications Programmer — This position offers high visibility in a group which has responsibility for development of personnel system with direct interface into the existing payroll system. Current opening requires a strong background in IBM C/AS, PL/I, IMS, and JCL. This position requires a degree plus two or more years of administrative programming experience. Salary range low to mid teens. The above positions are available at Cornell University in Ithaca, New York, a small city in the Finger Lakes region. In Ithaca, freedom from Urban smog and congestion combines with a stimulating intellectual community, cultural activities and recreational facilities are readily available. In any of these positions, you will be working with a top University administrative staff, and the broad range of intellectual and cultural activities of the University will be at your disposal. There are excellent benefits, including three weeks vacation per year. As an equal opportunity affirmative action employer Cornell particularly encourages applications from qualified minorities. Send resume and/or call:

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You will be involved in direct project-related interface in the application areas of general business & finance. Positions require 3-5 years current COBOL and OS/JCL, as well as small project experience.

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Will supervise, design and develop multiple MIS and computer modeling projects in the areas of business planning, analysis and management science. Requires 5 or more years in systems analysis and design. Financial modeling a plus. Supervisory experience and good communication skills mandatory.

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At least 8 years experience is required in specification, design and implementation of mini/micro-computer based hardware and system software. You should also have broad knowledge of business machine technology. An MS/MA in Computer Science or Engineering is required.

SYSTEM PLANNING SPECIALIST II

Working within the Advanced System Planning section, you'll be expected to analyze functional requirements and to devise technological means to satisfy them. The ability to effectively communicate with others in the section and in other segments of the company is important.

At least 5 years experience is required in the design and implementation of mini/micro-computer based hardware and system software. You should have at least a BS/BA in Computer Science or Engineering.

SYSTEM PROGRAMMER

Assigned to our Software Department, you'll design and prepare flow charts of modules of system software programs. You'll also code, test and prepare program documentation.

At least 2 years experience is required programming in ASSEMBLY and a higher level language such as FORTRAN or PL/I. Experience should include implementation or maintenance of mini- or micro-computer system software. A BS in Computer Science, or its equivalent, is also required.

Learn more by sending your resume and salary history, in confidence to Mr. Barry Depeuw.



MONROE

A Division of Litton Industries
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- 2-3 Years experience OS/MVS TSO
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ALLEN SERVICES CORPORATION

Headquarters
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CRAY RESEARCH

Builds For The Future!

CRAY RESEARCH is the leader in the large scale scientific computer business. We are a rapidly growing company with a variety of widely diverse, interesting positions in a small company atmosphere.

PRODUCT MANAGER

The Product Manager is a key position in the Product Management and Support Department. This manager will be responsible for the development of the product and the marketing plans of CRAY RESEARCH INC. In-depth reports, refining marketing goals of the product, along with strategy for insured market acceptance is required in this position. The position requires an advanced degree in Business Administration or the equivalent. In addition, an undergraduate degree in Math, Physics, computer Science or equivalent is highly desirable, plus the ability to work with the technical people in understanding of scientific processes. Engendered confidence and cooperation are skills required for the ProductManager position.

SYSTEMS PROGRAMMER

CRAY RESEARCH is in the process of expanding its talented Programming Staff. We have openings for experienced Programmers. The positions include operating systems, development, maintenance and other challenging and interesting duties. These positions are located in the Twin Cities of Minneapolis and St. Paul, Minnesota.

INSTRUCTOR

(Computer Hardware)

This person will be instrumental in all phases of developing courses for customers and employees. The instructor's primary duties are to design and implement hardware training course for classroom instruction. The applicant should have a minimum of 2 years teaching experience and 2 years maintenance experience on large scale computer systems. Writing exposure is a plus. Location is Chippewa Falls, one of Wisconsin's most attractive and scenic recreational areas.

CUSTOMER ENGINEER

We currently have openings for talented computer professionals for assignment at several sites. Several years of experience on large scale computer systems is necessary. After several month training on the Super Scale Cray-1, the successful candidates will be assigned to a customer site.

In addition to a highly competitive compensation and benefits package, you will be joining a highly successful and growing organization. Please submit resume and salary history in confidence to:

A.E. Kennedy
CRAY RESEARCH INC.
1440 Northland Drive
Mendota Heights, MN. 55102

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RESEARCH, INC.**

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SR. SYSTEMS To \$28K
Hdqtrs. of international corp. seeks systems analyst with strong business, financial experience. Mgmt. responsibility, fast track career path. Extraordinary benefits.

SYSTEMS ANALYST To \$27K
Major communications corp. seeks seasoned analyst to join high powered marketing support group. Challenging systems development assignment. Modern benefits, security.

ANALYST PROG To \$25K
Industry leader in performance measurement seeks analysts/programmers with IBM assembly experience. Excellent location, growth corp. with solid future.

Client Co's pay all employment expenses. For info on these and other career opptys in the South East, contact in confidence David Miller, 703/790-1335.

FOX-MORRIS
Personnel Consultants
7921 Jones Branch Drive
McLean, Va. 22102
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Private expanding organization needs qualified people for long term employment. Medium size 370/145 I Meg DOS/Vs environment. Cobol, ALC & RPG II. Installing PMS for on line insurance processing.

Experience in following areas helpful:

- Property & Casualty Insurance
 - PMS Package
 - On-line programming & design
 - 3270 Type Devs.
 - CICS/VSE Exper.
 - Accounting/Statistical knowledge
- Some college preferred. Salary in line with experience.

Send resume to:

MANAGER
SYSTEMS & PROGRAMMING
VIRGINIA FARM BUREAU
MUTUAL INSURANCE CO.
P.O. BOX 27352
RICHMOND, VIRGINIA 23261
(804) 788-1234
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Conn. corp's. seeking indiv's. with DEC-10 and/or PDP/11 tech. bkgrd. to provide future direction in new systems. Very visible, challenging oppty's. in excellent living areas. Salary to \$26,000. Contact Stan Durbas or Paul Meissner.

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Hartford, Conn. 06103
(203) 278-7170

COMPUTER PROFESSIONALS

SPERRY UNIVAC in Salt Lake City

Has current openings for professionals with an appropriate degree and a solid background in the computer industry.

Our General Systems Division is a rapidly expanding development and manufacturing complex where our people are directly involved in a variety of hardware / software development activities helping us meet the needs of today and the future for terminals, communications and small business systems.

Consider the following challenges and opportunities:

ELECTRICAL ENGINEERING: BSEE / MSEE and seven years experience or related interest in transformers and video fundamentals, transient analysis, semi-conductor linear circuit design, CRT power supply and high voltage deflection circuitry design. Experience in EMI / RFI suppression, grounding design or logic design desirable.

SYSTEMS ENGINEERING: To define functional specifications of terminals and/or communications processors including interfaces with peripherals, host CPUs, and data communication networks; identify hardware, microprogram and software functions; performance and throughput analysis and measurement; document error, recover and correction procedures and requirements. BSEE w/experience.

MICROPROGRAMMING: Write, debug, release microprograms associated with terminals and communications processors. Involves large, high-speed micro-processor-programmed processors and controllers; a wide variety of processor-on-a-chip microprocessor; soft microcode and firmware (microcode burned on ROM). Generation and use of a variety of assemblers, cross compilers and higher level languages may be required. BSEE w/experience.

DVR PROGRAMMING: To apply assembly language programming and knowledge of data communications and microprocessor architecture to a hands-on environment in support of the very latest equipment engineering. BSCE / BSEE or equivalent.

SYSTEMS PROGRAMMING: Participate in various levels of analysis, design, development, implementation and customer support of systems software for data communications, networks, data entry, terminal handlers and operating systems. Or, apply assembly language and familiarity with display terminal system to functional definition, detail design, coding and test and integration for both mini-computer operating systems and file management system. BSCE w/experience.

Consider Sperry Univac and Utah — where you can combine the excitement of a unique life style amid some of the most spectacular mountain scenery in the country with the challenge of the state-of-the-art of terminals and communications development.

Call toll free: 1-800-453-4534 or send resume complete with salary history to:

Employment Department
Sperry Univac
322 North 2200 West
Salt Lake City, Utah 84116

SPERRY UNIVAC

AN EQUAL OPPORTUNITY EMPLOYER M/F/V/H

MONTGOMERY COUNTY PUBLIC SCHOOLS

Data Processing

The Department of Management Information & Computer Services offers a unique environment for professional development & growth. The expanding department continues business & administration applications, MIS projects, educational data processing and instructional systems. All of these in a data base and software engineering environment. Requires outstanding human relations skills with experience in one or more of:

IBM-370/OS/VS1 (moving to MVS) ANSI COBOL
IDMS PSCAL BASIC CICS, CICS/DMS
COURSEWRITER IIS VTAM/NCP VSPC

SYSTEMS ANALYST (\$23,766-\$32,084) Project/task leader on data base development projects. Design and implement applications employing structured design and analysis techniques. Requires significant analytical, data base, structured design and analysis, and project leadership experience.

SYSTEMS PROGRAMMER (\$20,200-\$26,556) Responsible for installation, support and fine tuning of systems software. Requires significant systems programming experience in OS/VS1 environment, also CICS, DMS, VSPC, MVS, TSO, IDMS.

ANALYST/PROGRAMMER (\$19,344-\$25,750) Responsible for applications module design, specification and programming. Coordinates programming tasks using structured techniques in a COBOL/Data Base environment and also in Micro processor environment. Requires analytical experience, and experience in structured programming. Also requires micro-processor experience in Assembler, BASIC or PASCAL.

PROGRAMMER (\$17,576-\$23,504) Responsible for developing COBOL/Data Base programs from structured designs and specifications.

DATA BASE PROGRAMMER (\$17,576-\$23,504) Responsible for DB programming functions including DB LOAD/UNLOAD programs, DB restructuring. Participates in generation of DB systems, training and assistance to application programmers. Requires combination of COBOL/OS/JCL experience and Data Base experience (preferably IDMS).

COMPUTER OPERATOR (\$12,084-\$15,912) Responsible for machine and computer operations. IBM-370/OS/VS1 experience required.

DATA CONTROL SPECIALIST I (\$12,084-\$15,912) Responsible for operation and control of production systems. Requires three years of responsible DP operations and control experience, preferably in an OS environment.

KEY-PUNCH OPERATOR (part-time — \$4.75-\$6.05 per hour) Responsible for Data Entry on IBM 129 or CMC-5. Experience required.

Many outstanding benefits. Positions available July 1, 1979. Send detailed resume by June 29, 1979, to:

MONTGOMERY COUNTY PUBLIC SCHOOLS
Dr. Stephen M. Rohr, Department of Personnel Services
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NOW is your opportunity to join a company that has pride in its people.

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DEX 11 Series, DEX 20
G.E./Honeywell
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6600 Dasher Street, Suite 203
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(703) 825-1500

AMERICAN STANDARD COMPUTER CORP.

data processing

PROGRAMMER COBOL

We are a leading multi-branch financial institution with an excellent record of growth and profitability. Our present EDP capabilities require expansion into many new areas of computer applications.

We seek a programming professional with 5 or more years experience in COBOL programming to assume a key role in the programming/implementation of a number of new systems applications now under development. Financial applications a plus.

Salary negotiable depending upon qualifications. Please submit resume and salary history to, Linda Simonides at:



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Cobol Program Generator for Data General Commercial Systems
CODA (Cobol Development Aid)

CODA interacts with the user to create standard Data General Cobol programs utilizing the interactive features available under ICOS and AOS.

CODA is parameter driven and generates complete "structured" programs including file definitions, procedure division, screen and report specifications — ready to compile and run.

COSA encompasses a number of features and options which include the ability to generate the following program types:

File Maintenance Reports Enquiry Document Printing Transaction Processing

CODA is non-programmer oriented in its design. Inquiries may be directed via Computerworld, 797 Washington Street, Newton, MA 02160.

Or to:

INTEGRATED SOFTWARE SYSTEMS PTY LIMITED
 71 Queens Road, Melbourne, Australia 3004.
 Representatives of ISS will be in the U.S. during June to July and will directly respond to local inquiries directed via Computerworld.

Staff Systems Analyst

Product Movement

Vital subsidiary of Fortune 100 corporation has a professional position available for an experienced Systems Analyst, at its King of Prussia facility.

Position responsibilities will encompass providing Systems Analyst expertise for a realtime computerized supervisory control system. Duties will involve designing/maintaining all software; providing technical support in analysis, acquisition and installation of systems; acting as outside liaison; troubleshooting internal systems problems; supervising and training computer staff and developing new methods and designs to provide greater efficiency for systems operation.

Must possess a BS in Computer Science or the equivalent and be proficient in analysis, interpretation and communications skills. Knowledge of realtime computer software with assembly language and FORTRAN programming required. Must be available for call outs to minimize system downtime and may be assigned to other than day shift.

This division of an international corporation will provide you with excellent opportunities for professional advancement and achievement along with a very competitive salary, (\$24, to \$29,000, depending on experience and potential) and a full range of company benefits. Interested professional applicants should send their resume, including current salary, in confidence, to:

Department SSA
 CW Box 1971
 797 Washington Street
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OVERSEAS OPPORTUNITIES

A prestigious VENEZUELAN firm has immediate openings for the persons experienced in the following fields:

AVIATION ADVISOR [1]

Graduate preferred with experience in both operational and commercial matters. This is a two-year assignment

DATA BASE ANALYSTS [2]

Must have minimum of 5 years experience in Data Processing (programmer/analyst) including two years applications system analysis/ design under IDMS DB/DC

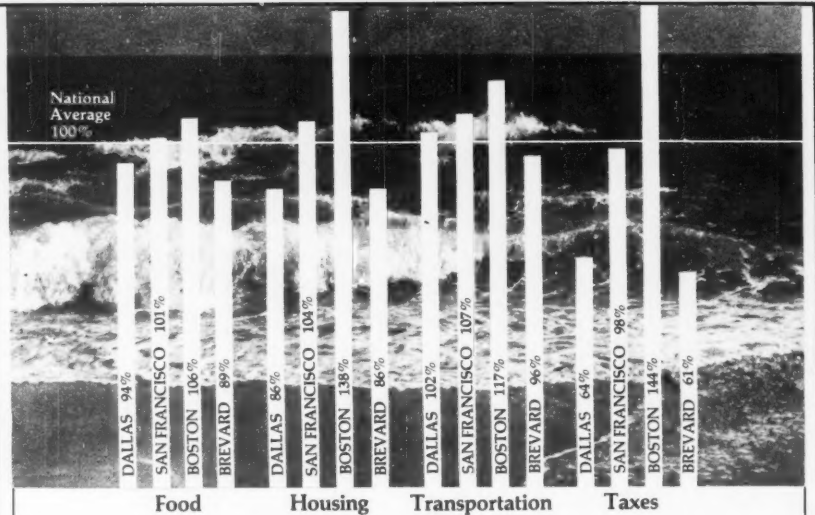
DATA BASE/ DATA COMMUNICATIONS TECHNICAL SUPPORT [1]

Requires minimum of 2 years experience in System Generation (DB/DC) IDMS internals. Design of IDMS data bases experience is desirable and a minimum of 3 years experience in the implementation and tuning of IDMS data bases (DB/DC). Knowledge of MVS (JES2) internals plus experience with MVS (JES2) JCL, utilities, assembler language VSAM — access method services, ISAM/OSAM, teleprocessing (DC). High level of IDMS DB/DC technical expertise/working knowledge.

Data dictionary experience in operational environment.

Bilingual Spanish/English is a prerequisite on the above positions. We offer excellent salary and many extra benefits. Only candidates meeting these requirements should forward a detailed resume to:

One Concord Avenue, Larchmont, N.Y. 10538



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Well, there's no faster growing worldwide industry than the communication and information processing industry.

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 MARKETING/APPLICATIONS ENGINEERS
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 INSTRUMENTATION ENGINEER
 QUALITY ASSURANCE ENGINEER
 TECHNICAL RECRUITER

Send resume with salary history to: Staffing,
 Harris Semiconductor, Dept. No. 191,
 P.O. Box 883, Melbourne, Florida 32901.

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Send resume with salary history to: R.B. Storch,
 Harris Controls Division,
 P.O. Box 430 CW, Melbourne, Florida 32901.



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SYSTEMS ENGINEERS (FIELD ENGINEERING, SYSTEMS PROGRAMMING) ANALYSTS PROGRAMMERS

Virginia Tech, located in the mountains of Southwest Va., has career opportunities in these areas. Good State benefits with educational opportunities available. University Computer Resources include IBM 370/158's with MVS/IMS, and VM/CMS; Honeywell MULTICS system; and a large variety of mini and micro computers. Contact Robin Ball, Personnel Office, 324 Burruss, VPI & SU, Blacksburg, Va 24061 (703) 961-5301. An Equal Opportunity/Affirmative Action Employer.

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National software firm has openings throughout the United States for programmer with 2+ years exp. on any large scale system. Background can be COBOL, FORTRAN, PL/1, MARK IV or BAL. Salaries from \$17 to \$27,000. All relocations paid. Resume & Sal. to

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We've built our reputation on innovation and advanced technology because we encourage the independent creative contribution of every one of our people. Last year we went over 300 million in revenues, up from 162 million just a year earlier, so we know our philosophy works.

If you are a self-motivator looking for a new challenge, STC offers the opportunity for contribution and individual development not often found with a major corporation.

Requirements are:

- A college degree (or equivalent experience)
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We are building a top-notch technical marketing support team to complement our unequalled products, performance, and service.

For fastest consideration with absolute confidentiality send your resume to:

Bill Waibel
Dept. CW/6-18
MD-R1

STORAGE TECHNOLOGY
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2270 South 88th Street
Louisville, CO 80027
or



Give Bill a call TOLL-FREE at 800-525-2940 ext. 6551 or Fred Moore ext. 3008 for further information. We have a lot to say that you'd like to hear.

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Live In SOUTHWEST FLORIDA Where You Can Swim, Waterski, Sail, Fish, Skin Dive, Etc. Year Round.

- Development of a totally new system for the resort condominium industry
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- Experience in BASIC or BASIC PLUS with RT-11 or RSTS/E required.

Call Waldo Bibb, collect, to arrange an interview or send your resume to:

SYSTEMS INTERCHANGE CORP.

660 Tamiami Trail North - #21
Naples, Florida 33940
(813) 262-2683

APPLIED DATA RESEARCH

Princeton, New Jersey

SOFTWARE DEVELOPERS

ADR is the #1 software products company in the world. We are large enough to be stable and respected, small enough to be informal—with room for personal recognition and professional advancement. Our attractive Princeton, N.J. location offers a quiet rural environment within easy reach of both New York City and Philadelphia.

We are currently embarking on several new projects. The result is an immediate need for a variety of talented and highly motivated data processing professionals.

All positions require two or more years of Assembly language programming experience and a B.S. or M.S. degree in Computer Science or a related field. Relevant experience may be accepted in lieu of a degree.

• Online Program Development Systems

Telecommunications Specialist—Design and implement TP subsystems to support local and remote 3270-type and TTY-compatible devices. Requires expert knowledge of START/STOP and bisync line protocols.

Compiler/Interpreter Writer—Participate in development of a new online procedure language. Special emphasis will be placed on a "user friendly" design. Knowledge of compiler writing and error recovery and repair techniques required.

Software Programmer—Participate in development of online product under CICS and DATACOM/DC in OS/VS and DOS/VS environments. Familiarity with CICS or DATACOM/DC and knowledge of OS/VSI or DOS/VS internals highly desirable.

Software Programmer—Participate in development of online debugging aids. Knowledge of COBOL essential.

• DOS/VS/VSE Performance Measurement

Assist in the design and implementation of performance measurement tools for DOS/VS. Requires knowledge of DOS/VS internals. Familiarity with performance measurement preferred.

• Online Program Generation Systems

Assist in the design and implementation of an online program development/generation system. Requires familiarity with commercial applications, data base concepts and language processors (compilers, interpreters, or query languages). Programming experience with display terminals preferred.

• Data Management Systems

Lead a team of analysts in the design and implementation of a data management system for online and batch access. The problems you will be addressing include: data security, multi-CPU access, distributed processing and data encryption. Requires knowledge of MVS internals. Knowledge of data base concepts preferred.

• Source Program Management Systems

Participate in design and implementation of new features and enhancements for one of the industry's best-known software products. Heavy DOS/VS system experience essential.

Call ADR at 609/921-8550 or send your resume, including the position for which you wish to be considered and a complete salary history, to:

DIRECTOR, SOFTWARE PRODUCTS DIVISION



APPLIED DATA RESEARCH

Route 206 Center, CN-8

Princeton, New Jersey 08540

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For long-range, part-time assignments for prestigious New England University. Consultants required who are experts in following areas:

- Structured Systems Analysis
- EDP Performance Measurement
- EDP Security
- Data Communications
- Word Processing
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- Data Base Systems

CW Box 1970
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Newton, MA 02160

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Masters degree and 3 years related work experience required. Teaching experience in languages, operating systems and data bases desired. Send resume by 30 June 1979 to Dr. Ray L. Sisson, School of Aseel, University of Southern Colorado, Pueblo, Co. 81001. An equal opportunity employer.

Programmer/ Analyst:

Must have two years experience, main expertise in FORTRAN with some knowledge of COBOL, and two years of college or equivalent. Responsible for administrative and academic applications programming at small liberal arts college. Salary commensurate with qualifications and experience. Send resume and three letters of recommendations by July 1, 1979 to: Dr. Merrill A. Espigh, Registrar, Hampden-Sydney College, Hampden-Sydney, Virginia 22942. An Equal opportunity, affirmative action employer.

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(In MO. 1-800-892-7655 ext 804)

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Sys Prog(s) MVS	\$22-\$30K
Project Ldrs, IMS-COBOL	\$20-\$26K
Programmer/Analyst(s) COBOL	\$16-\$24K
Programmer/Analyst-Banking	\$16-\$24K

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Jim King and Associates

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(904) 398-7371

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In addition to excellent direct compensation, we offer a comprehensive benefit package and superior promotion opportunities.

Join us in Ann Arbor, Michigan, for an exciting career, a beautiful setting, and a comfortable way of life.

For immediate consideration, send your resume in complete confidence to:

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1211 NORTH WESTSHORE BOULEVARD
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813/872-1853

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- Cleveland/Akron, Ohio
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- Philadelphia, PA
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(215) 835-2500, Ext. 1436
- Miami, FLA
Angel Moreno
(305) 592-5293
- New Orleans, LA
Bill Breerwood
(504) 733-1600
- Nashville, TEN
Dave Abbott
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- Chicago, IL
Paul Loos
(312) 671-1800

Systems Representatives

We'd prefer systems Reps or Analysts, with experience in small, or small/medium systems to support our sales force. The ideal candidate should have a working knowledge of COBOL, and operating systems, with an added plus for manufacturing, data base, or communications systems experience.

- Columbia, MD
Ron Walts or Chuck Bouton
(301) 730-7620
- Birmingham, ALA
Doug Ligon
(205) 323-2431
- Minneapolis, MN
Jim Antosh
(612) 830-3912
- Greensboro, NC/Roanoke, VA
Fran Whisnant
(919) 294-3280

We're looking for fast track professionals who will not only give the competition a run for the money but will have what it takes to beat them out, and achieve above average earnings. Even if you're not actively seeking a new position, we believe this is an opportunity you should investigate.

If you're a Marketing or Systems professional who'd like to rise to new heights, grab the initiative and cash in on the opportunity of a life time. CALL HONEYWELL COLLECT.

If unable to call send resume complete with salary history and location: For Eastern U.S. - Ken Nadow, HONEYWELL, INC., 200 Smith Street, Waltham, MA 02154. Or, for Western U.S. - Bob Brown, HONEYWELL INC., 7400 Metro Blvd., Edina, MN 55435.

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Edge

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ROCKWELL IN COLORADO

In a beautiful Colorado location along the front Range of the Rockies, Rockwell's Rocky Flats Plant near Denver has immediate opening for:

SYSTEMS ENGINEER

At least 7 years experience in data processing with at least 3 years experience in systems programming. Must have training in terminal oriented systems, systems programming, communications, communications access methods, line control techniques and time share concepts and techniques. Should have a BS Degree in a technical field. Responsibilities will include planning, designing and installing data communication networks in support of data processing systems. Also analysis of current and planned network usage and the evaluation, development and maintenance of data communications software.

By virtue of our operating contract with the Department of Energy, we can consider U.S. citizens only. Please send resume and salary history in confidence to:

Dan Hagan
Employment Department
Rockwell International
Energy Systems Group
Rocky Flats Plant
P.O. Box 464
Golden, CO 80401



Rockwell
International

We are an Equal Opportunity Employer. Minorities, Women and Handicapped Are Encouraged to Apply.

PROGRAMMER ANALYST

JOIN A "LEADER" IN TODAY'S ENERGY MARKET

We are currently recruiting for one of the "GIANTS" in the Oil Industry. The position that we are looking to fill requires an experienced Programmer Analyst who should be familiar with ANS COBOL, TSO and various OS programming techniques. You will become involved in "State-Of-The-Art" applications including IMS, Data Base Design and Programming on the latest IBM hardware including the 3033 and 4100 series.

This is an excellent opportunity for someone who is looking to become more involved with business systems analysis and design work. There is also a potential to move into Project Management within the near future.

In addition to attractive salaries and benefits, the company offers cost of living index and a handsome stock option and profit sharing program. Qualified applicants should submit their resume in confidence to NEIL LANG or phone (201)994-4730.

Central EDP

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DATA BASE ADMINISTRATION

If you have experience of at least four years in IMS data base design, recovery and restart, IMS utilities, performance and data dictionary and want to work for a leading health care organization with state of the art IBM hardware and software, there are many opportunities available.

Positions will provide guidance, coordination, administration and design, and control of the data base environment. This includes support of IMS utilities, consulting with application programmers on design review, identification of content and organization of data bases, establishing and enforcing access to data bases, ensuring integrity of data bases and establishing backup procedures. Top notch fringe benefit package offered. Salary commensurate with experience. Please forward resume to Verna Rozenberg.

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Inquiries and current vita should be sent to: Dr. James D. Schoeffler, Chairperson, Department of Computer and Information Science, Cleveland State University, 1983 E. 24th St., Cleveland, OH 44115. (216) 687-4760. Equal Opportunity Employer M/F/H.

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One year systems programming in OS environment required. VM/370 and CMS preferred. Three years minimum in software development using IBM hardware. The administrative area provides you with a Univac 1100-11. The education area provides you with an Intel AS/4 Processor, Comten communications HP 2000 and 5 remote mini computers. For information write or call: Maricopa Community Colleges, 3910 East Washington, Phoenix, Arizona 85034. (602) 244-8355, extension 395. CLOSING DATE: July 6th, 1979.

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The NCAR Computing Facility has a staff of 100 with responsibilities in scientific applications, data processing, and technical support. This large central facility supports atmospheric research at NCAR and in universities across the country. Its computing systems — the Cray Research CRAY-1, the Control Data 7600, and the Ampex Terabit Memory — provide the capabilities for large atmospheric simulation models and extensive data collection systems.

POSITION:

As Manager, you will be responsible for planning, acquisition, systems design, and the operation of a central facility. You will interact with top management at NCAR, throughout the atmospheric science community, in government and industry, to determine user needs and acquire necessary resources, and you will monitor the effectiveness of activities and operations in order to ensure a high level of productivity and up-to-date facilities.

QUALIFICATIONS:

To qualify, you should have demonstrated high-level skills in direct management of programs that involved planning, development, delivery, or use of scientific computing systems. You should have had substantial responsibilities in scientific computing, including solid and progressive management experience. You should hold a Ph.D. in computer science, physical science, mathematics, or engineering, or have had equivalent experience. You should be able to give evidence of the interdisciplinary knowledge needed to plan large scientific computing services, leadership skills, peer recognition (professional society office, fellowship, etc.) and good communication skills.

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We're looking for individuals AT ALL LEVELS UP TO SENIOR with strong creative design and communications skills. Business systems experience is required and must include accomplishments in several of the following: Bill of Material, Inventory Control, Shop Floor Control, Master Schedule, Purchasing, Material Requirements Planning, General Ledger, Cost Accounting, Accounts Payable, Accounts Receivable, Order Entry, Field Service, Remote Plan Support.

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In software, we are developing on-line, real-time control programs using the latest design techniques in structured programming and off-line support and diagnostic software. Our hardware support includes an IBM 370/168 and an IBM 3033. Design automation, Computer Aided Design, on-line interactive graphics, Data Base Management Systems, and other programming areas offer a wide range of challenge to your continued professional advancement. We have openings for professionals in the following areas:

- Computer Aided Design & Development
- Data Base Systems
- Real Time Systems
- Systems Diagnostics
- Signal Processing
- Stored Program Digital Systems
- Telecommunications switching and control systems (microprocessor or large CPU controlled)
- Large scale on-line systems management and executives
- Simulation
- Application Software
- Teletraffic analysis and modeling
- Long Range Planning

If you have a degree and experience in Computer Science, Electrical Engineering or Mathematics, we invite you to find out more about R & D careers in our unique technical environment. We can offer you an excellent salary, complete corporate benefits and a rare potential for personal and professional development. For prompt consideration, send resume to: George Protos, Technical Employment, Dept. 471 A6, GTE AUTOMATIC ELECTRIC LABORATORIES, 400 N. Wolf Road, Northlake, IL 60164.

Equal Opportunity Employer M/F



Research and
Development

Computer Career Opportunities in Texas

Synercom Technology, Inc., has immediate career opportunities for you at our new headquarters located in Sugar Land, Texas, a suburb of Houston. We are a young, dynamic computer systems company specializing in interactive graphics information systems. Our products are marketed worldwide with emphasis to such industries as utilities and municipalities, engineering construction, metal buildings, and offshore construction.

We offer an outstanding benefits package for our employees as well as the opportunity for you to work with an exceptional staff of computer professionals. Record earnings and backlog have enabled us to open the following growth positions:

PROGRAMMER/ANALYSTS

Several positions available for applicants with up to 6 years Fortran background. Experience with interactive graphics, minicomputers (DEC PDP11s) and engineering/scientific applications desirable. Salary commensurate with experience.

FIELD SERVICE TECHNICIANS

Computer-related maintenance experience is desirable. Military or trade school background acceptable. Familiarity with DEC PDP11s desirable but not mandatory. Requires some travel. Salary commensurate with experience.

If you are ready to make a move in your career to a progressive, fast growing company located in the Sunbelt, we'd like to hear from you. Call collect (713) 491-5000 for L. R. Burkhalter or send your resume to Synercom Technology, Inc., 500 Corporate Drive, Sugar Land, Texas 77478.



An equal opportunity employer M/F

Synercom Technology, Inc.

SEATTLE/ PORTLAND

• **Programmers**
• **Programmer/Analysts**
We seek inquiries from outstanding programmers and analysts wishing to advance their status/income, while adding to their hardware, software and applications capabilities. Our major clients in the Pacific Northwest have several very attractive openings.

• **Communications**
We are seeking a senior person for Blue Chip Company to work as part of Systems Engineering team on current PDP 11 figures DECnet network and meet future network challenges. At least 3-5 years experience necessary; knowledge of DEC System 10/20 operating system desirable, other vendors seriously considered.

• **Group Manager**
Excellent opportunity to play a major role in an aggressive development effort for a large corporation. Must have at least 5 years experience with financial applications and have managed people in a project environment. Good advancement potential and exposure to upper levels of management.

• **EXECUTIVE**
• **RESOURCES, INC.**

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Jefferson County Schools is seeking a programmer/analyst to develop on-line applications in both the financial and student record keeping areas. Applicants must be proficient in CICS, COBOL, PL/I and DOS/VS JCL. At least 3 years of successful programming background and a college degree or equivalent technical degree required. Start immediate, at \$16,000 to \$20,000 for 229 day work year with excellent benefits; opportunity to advance to \$22,000 - \$24,000. Send resume to Jefferson County Schools, 1215 Quail St., Lakewood, Co. 80215. EOE.

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A young and rapidly growing data management consulting firm, located in Suburban Philadelphia, has an opening for a Sales Marketing Manager. We currently have several powerful software systems and many new products under development.

We are looking for an individual who has a STRONG sales background and a proven record of accomplishment. You will be responsible for sales promotion literature, trade shows and exhibits, sales presentations and public relations. A degree, preferably in Business, Communications or equivalent, plus 5 years experience in computer software marketing and promotion is required. Excellent writing ability, knowledge of marketing and sales requirements, data processing and proposal preparation is a MUST.

We offer an excellent salary, competitive benefits package and the opportunity for professional growth. For prompt consideration, please forward your resume including salary history to:

Dept. A-12, P.O. Box 544
Philadelphia, Pa. 19105
Equal Opportunity Employer, M/F

DATA BASE ANALYST

LOUISIANA STATE UNIVERSITY

You'll find challenging and outstanding potential in a dynamic state-of-the-art shop. LSU currently has a 370/3033, OS/MVS, IMS DB/DC, and MARK IV. This system supports a statewide educational system for LSU.

We have the following positions available:
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Analyst III. Minimum five years in data processing plus college degree (or additional experience) with two years system design experience preferably with IMS and its associated support products. A demonstrated ability to interface with management and users.
Analyst II — Minimum two years in data processing plus college degree (or additional experience) with systems design experience preferably with IMS. A demonstrated ability to interface with users.
Analyst I (anticipated) — Minimum requirements, a college degree (or equivalent experience) in an area relating to data processing.

If you are qualified for any of the above positions, please send your resume and salary requirements to:

Dr. John M. Tyler, System Network Computer Center
Louisiana State University, Baton Rouge, Louisiana 70803
Affirmative Action/Equal Opportunity Employer

PROGRAMMER/ ANALYSTS

\$1584-2217 proposed
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To design and prog. computer applications for a Burr. B-4800 and provide svcs. to a variety of depts. Starting salary commensurate with bkgd. Reqs. 2 yrs. of COBOL prog. exper. Please immediately obtain applications from Marin Co. Pers. Ofc., Rm. 416, Civic Ctr., San Rafael, CA 94903. Ph (415) 479-1100, Ext. 2013. EOE/AEE.

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Should have bkgd in various mfg appl. Cobol OS. Salary to \$24,000.

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Degree + hands-on EDP audit exp req. Progressive major corp. Min travel. Salary to \$23,900.

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Highly respected research firm is staffing a young systems and programming function. We are looking for a strong Senior Programmer/Analyst who is now ready to assume a challenging management position. You will organize our information systems area and be responsible for systems and program development.

Position is located in Los Angeles.

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CW Box 1972

797 Washington St.

Newton, MA 02460

An Equal Opportunity Employer

REALTIME SYSTEMS

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SR. SYSTEMS ANALYST:

Positions require previous exp in electronic warfare, avionics or counter measure applications. In addition in-depth Realtime Programming & assembler language background in req'd.

REALTIME PROGRAMMERS:

A min of 2 yrs Realtime Programming exp & assembler language is req'd. Exposure to hardware or some engineering knowledge would be a +.

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NYC

Programmer/Analyst to upgrade and maintain 200 MB MIIS-Standard data base for gov't funded research agency in legal area. Salary to \$20 K ngle. Reply in confidence to: Information Systems, 2 Lafayette Street 3rd Fl., New York, N.Y. 10007.

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Large community hospital located in popular coastal city and adjacent to several beautiful beach communities needs individual to assume responsibilities for day to day operations of expanding DP department. Must have a minimum of two years experience in DP operations and prior experience supervising computer operators. Send resume and salary requirements to: Ann Perry, Dept. H, P.O. Box 9000, Wilmington, NC 28402.

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Interviews in your area will be conducted in the near future. To arrange an appointment call Ms. Donna Lang collect at (212) 935-6500.

Informatics inc.

555 Madison Avenue New York, NY 10022
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SYSTEMS ANALYST/ PROGRAMMER ANALYST

The University of South Dakota is seeking a self-starting, project oriented, data processing professional to play a major role in developing new on-line, data base administrative computer systems. The University's operating environment includes an IBM 3031 (3 meg) under MVS/HASP, TSO, Complete and ADABAS. The Vermillion campus is the host site for multi-campus processing system servicing the academic, research and administrative requirements of 5 State-supported colleges.

The successful candidate will have four years of data processing experience; three years of which have been as a systems analyst or programmer analyst on large-scale systems, preferably in higher education systems. Each two years of college and/or vocational education may be substituted for one year of experience. Working knowledge of COBOL or PLI, OS JCL and LIBRARYAN helpful, but not required.

Salary range is \$15,199 - \$19,242.
Interested applicants should contact:

Department of Personnel
University of South Dakota
Siagle Hall

Vermillion, S.D. 57069

Deadline: July 6, 1979

Equal Opportunity Employer



ALL LEVELS of Computer Personnel Needed - Call or write to: ABC Personnel, P.O. Box 911, Elkhart, IN 46515, (219) 293-0596. Prompt, Confidential Reply. A personalized, nationwide, licensed employment agency. ALL FEES PAID.

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21-22K

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/PROGRAMMER

Phoenix, Arizona

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Young aggressive company with great future wants talented programmer who will assist president in all areas. Travel and sales are involved. Real-time and Dial-up on line systems experience preferred. Send resume with work and salary history to: President - Kemar, P.O. Box 4215, Phoenix, Arizona 85030

Weld and Boulder Counties Joint Data Processing Center is taking applications for its COMPUTER OPERATIONS MANAGER. Located in Greeley, Colorado, the Center is an easy distance to good fishing, hunting, skiing, and backpacking. Applicants will be responsible for the operation and supervision of the Operations, Data Control and Data Entry sections using an IBM 370/138 with DOS/VS and a large CICS/VS teleprocessing network. Must have two years college in related coursework with five years work experience in operations or programming and at least two years supervisory experience. \$19,500/year. If you want to live and work in Colorful Colorado in a challenging, progressive environment, send resume to: Weld County Personnel Department, 915 10th Street, Greeley, Colorado, 80631. Continuous Recruitment. Weld County is an Equal Opportunity/Affirmative Action Employer. M/F.

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An outstanding career opportunity beginning with participation in the design of a comprehensive, state of the art, management information system. As a full-time project analyst you will be responsible for the technical aspects of all on-line system requirements.

As a leading agricultural marketing and exporting corporation (\$600 million +) with rapidly growing sales, we can offer you a solid career challenge with D.P. management potential, excellent benefits, and pleasant surroundings. In a south central U.S. community under 100,000 population.

Requirements

- 4 to 6 years COBOL analyst/programmer experience.
- Current telecommunications expertise with one to two years experience
- Development and implementation experience with business applications
- Ability to effectively interface with user personnel and to propose creative problem solutions

Pluses

- Data base experience
- Formal technical training

Submit resume, including salary history and requirements, to: P.O. Box 2545, Denver, Colorado 80201.
Equal Opportunity Employer

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DIRECTOR HOSPITAL DATA PROCESSING UNIVERSITY OF MISSISSIPPI MEDICAL CENTER

The University Hospital, a 528-bed teaching hospital in Jackson, Miss., plans to significantly enhance computer-based services for patient accounting and hospital information systems. We seek a person to direct the planning, development and implementation of the software systems necessary to provide these services.

Candidates must have significant experience in hospital data processing, including some management responsibility, and a degree in computer science or some other relevant discipline. Experience in a large teaching hospital is particularly desirable. A minimum of three (3) years as a programming manager or project manager is required. Equal Opportunity Employer, Male/Female.

Contact:
M. Lightsey
Computer Sciences
Univ. of Mississippi
Medical Center
2500 North State Street
Jackson, MS 39216

PROGRAMMER/ANALYST SOUTHERN CALIFORNIA

National Tire Company requires a DOS/VS Programmer with BAL and COBOL experience to work on Accounting Programs. This is a ground floor opportunity with a 370 Host Computer and Distributed Systems. Salary \$21 - 26K and good fringe benefits. Forward resume to:

Bridgestone Tire
Company
P.O. Box 2964
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Or call: Gil Adorno
(213) 320-6030

Computer Systems Manager

City has immediate opening for D.P. manager with B.S. in Computer Science and min. 3 yrs. professional level exp. RPG and COBOL required. Data communications and data base management desired. \$16-24K. Send resume and salary requirements by July 1 to:

R. W. Bender
City of Boca Raton
201 W. Palmetto Park Road
Boca Raton, FL 33432
Equal Opportunity Employer

MIS Professionals

Digital's General International Area (GIA), charged with sales and service responsibilities in Canada, Latin America, Australia, the Far East, Africa and the Indian Subcontinent, has an immediate need for three MIS professionals. All of the positions are based at GIA headquarters in Acton, Massachusetts.

MIS Project Leader

This person must be able to work with user managers to solve business problems using a variety of approaches. These will include new systems development, enhancement of existing data. Our systems cover a wide range of applications (inventory, financial labor reporting, etc.) and are often implemented in a distributed environment. The applicant should have a BS/BA and a minimum of 4 years of data processing experience. This position affords the opportunity for about 15% of international travel.

Senior Programmer Analyst

In order to support the GIA Finance organization, this individual should possess a thorough knowledge and understanding of automated financial systems including general ledger, A/R and A/P. The selected individual will have 3-4 years experience as a programmer/analyst and possess good interpersonal skills. PDP-11 experience and a BS/BA would be a plus. About 10% international travel is involved.

Programmer/Analyst

This person will provide general programming support to the GIA MIS organization. Requiring 2-3 years of experience in commercial applications programming, this position offers an opportunity to gain systems design and analysis experience. PDP-11 experience would be a plus.

If you are interested and qualified, please send your resume, including salary requirements to Lee Otsubo, Digital Equipment Corporation, Dept. T618 3807, General International Area, Nagog Square, Acton, Massachusetts 01720. We are an equal opportunity employer m/f.

digital

NUCLEAR MEDICINE COMPUTING SPECIALIST

sought by a large, university medical center. Applicant should have M.S. in Computer Science with at least 2 years experience in software development for real-time applications on minicomputers. Job requires software development for research in nuclear medicine image processing, maintenance and operation of Varian V76 and VIP 450 minicomputers, and teaching of nuclear medicine data processing to physicians and technologists. **Starting salary \$11,700. Send resume to Carol Cassidy, Missouri Job Service, 4645 Gravois, St. Louis, MO 63116.**

Equal Opportunity/Affirmative Action Employer, M/F/H

Purdue University Computing Center, a large academic and research computing facility, has openings for

SYSTEMS PROGRAMMER ELECTRONICS ENGINEER

Applicant should have a B.S. or M.S. degree in computer science or electrical engineering or related area, along with at least one year of relevant experience.

Systems programmer should have experience with Control Data 6000/Cyber operating systems. Will assist in development and maintenance of programming systems and assume programming project responsibilities.

Electronics engineer should have experience in Digital logic design. Will assist in development and maintenance of Digital Electronic Equipment. Mini/micro computer programming experience helpful.

Salary range \$13,000 - \$20,000 With Excellent Fringe Benefits.

Please contact or forward resume to Suzanne Magyar, Employment Representative, Personnel Services, Dept. 401, S. Grant, West Lafayette, IN 47907 (317) 749-6256.

Purdue University is an Equal Opportunity/Affirmative Action Employer.

ASSOCIATE SYSTEMS ANALYST

Phoenix Mutuals Data Processing Department seeks individuals who possess an Associates Degree or Bachelors Degree in good academic standing and at least 3 months of applications experience using COBOL on a large or medium scale, IBM 360 or 370 to engage in programming systems maintenance and design and frequent user contact. Sound communication and interpersonal skills are required. If qualified you will work in a pleasant productive business environment approximately 36 hours per week at an annual salary of \$14,000-17,000.

If interested, send resume, in confidence to: Joanne M. Stevens, Personnel Assistant.

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Mark Fuller

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Experience in NEAT/3 and COBOL languages a must. Should have up to date knowledge of NCR operating systems (B1, B2, B3 & IMOS). To be in charge of in-house system analysis and design program development and maintenance. Must be willing to relocate to beautiful Santa Maria, CA. Position now available. Send resume to Williams Bros. Markets, P.O. Box 305, Santa Maria, CA 93456.

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Hardware
IBM 370-138

PROGRAMMER/ ANALYST

Responsible for the programming, implementation and maintenance of business systems. Should have 2-3 years of COBOL experience.

SYSTEMS PROGRAMMER

Responsible for the implementation and maintenance of operating software for an IBM 370/138. Experience with DOS/VS and CICS required.

SYSTEMS ANALYST

Responsible for the design and implementation of new systems. Must be able to communicate with user Departments and have the capability to function as a Project Leader.

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Performance Development
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CONTACT:

Lisa Brown
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2220 Tulare Street
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Richard F. McDonald
Business and
Personnel Manager
U of Massachusetts Library
Amherst, MA 01003
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Software Professionals

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The Technical Services Division of Sperry Univac provides systems design, applications analysis, programming and other software services to a wide range of customers. We continue to grow in technological capabilities and contract commitments. Immediate openings exist in the following locations:

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TECHNICAL SERVICES DIVISION

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Two positions available:

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Minimum qualifications — Systems Analyst are:

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Minimum qualification — Computer Programmer are:

Two years experience in RPG II and COBOL. HP 3000 experience preferred.

Excellent benefits and salary. Send resume to Don Edwards, Director of Personnel Services, Great Falls Public Schools, 1100 4th Street South, Great Falls, MT 59405. An EEO Employer.

The Washington Metropolitan Area Transit Authority is seeking proposals for an extensive management review of its data processing functions and management information system. Proposals must address hardware utilization and performance, data output reliability, ADP policy-making and oversight, a 5 year master plan, and other major management concerns. Documents will be available on or about June 1, 1979.

For further information please contact:

Mr. Richard Lucas
Washington Metropolitan
Area Transit Authority

Office of Budget
and Management Analysis
600 Fifth Street, N.W.
Washington, D.C. 20001



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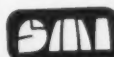
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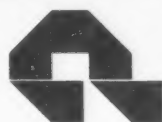
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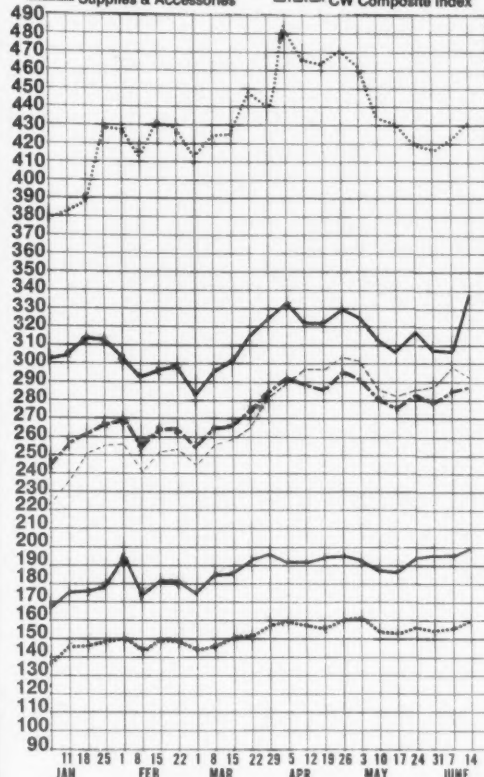
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Three Months Ended March 31

	1979	1978
Shr Emtd	\$3.02	\$1.7
Revenue	18,661,000	12,865,000
Tax Cred	8,647,000	748,000
Earnings	17,712,000	1,071,000

a-Restated.

TELEPHONE COMPUTER

Three Months Ended March 31

	1979	1978
Revenue	\$4,285,940	\$2,048,374
Loss	116,515	517,033
6 Mo Revenue	7,609,270	4,557,580
Loss	428,186	643,398

TELETYPE

Three Months Ended March

	1979	1978
Shr Emtd	\$3.39	\$5.1
Revenue	25,257,000	20,219,000
Earnings	1,309,000	1,660,000

VARIAN ASSOCIATES

Three Months Ended March 31

	1979	1978
Shr Emtd	\$5.51	\$1.8
Revenue	118,623,000	92,987,000
Disc Op Loss	...	669,000
Earnings	3,758,000	1,350,000
6 Mo Shr	...	60
bRevenue	219,895,000	180,089,000
Disc Op Loss	c10,154,000	1,051,000
Earnings	(3,114,000)	4,547,000

a-Restated. b-From continuing operations. c-Includes provision of \$9,270,000 for loss on disposal of discontinued operations.

ANALOG DEVICES

Three Months Ended April 28

	1979	1978
Shr Emtd	\$3.33	\$5.21
Revenue	28,884,000	15,746,000
Earnings	1,679,000	1,009,000
6 Mo Shr	63	6.41
Revenue	45,421,000	29,846,000
Earnings	3,175,000	1,935,000

a-Adjusted to reflect 100% stock dividend paid in April 1979.

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Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, JUNE 13, 1979

All statistics compiled,
computed and formatted
by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

PRICE					PRICE					PRICE				
1978-79	CLOSE	WEEK	WEEK		1978-79	CLOSE	WEEK	WEEK		1978-79	CLOSE	WEEK	WEEK	
RANGE	JUN 13	NET	PCT		RANGE	JUN 13	NET	PCT		RANGE	JUN 13	NET	PCT	
(1)	1979	CHNGE	CHNGE		(1)	1979	CHNGE	CHNGE		(1)	1979	CHNGE	CHNGE	
COMPUTER SYSTEMS														
A ANDAHL CORP	25-69	25	-13 1/2	-35.0	O ADVANCED COMP TECH	1-2	1 5/8	0	0.0	A DATA ACCESS SYSTEMS	0-10	8 3/4	-1 1/4	-2.7
N BURROUGHS CORP	59-87	71 1/4	+7 7/8	+1.2	O ANACOMP INC	8-22	15	-1 3/8	-8.3	A DATA PRODUCTS CORP	13-25	14 3/4	+1 1/4	+1.7
O COMPUTER AUTOMATION	15-44	18 3/4	+3 3/4	+4.1	A APPLIED DATA RES.	8-17	10 1/8	+3 3/4	+7.4	O DATUM INC	2-6	2 5/8	+1 1/8	+5.0
N CONTROL DATA CORP	23-44	38 1/4	+1 1/8	+0.3	N AUTOMATIC DATA PROC	24-36	34 1/2	+1 1/2	+1.4	O DECISION DATA COMPUT	2-6	4 1/8	0	0.0
O CRAY RESEARCH INC	8-39	37	+1	+2.7	O COMPU-SERV NETWORK	5-16	14 1/4	-1 1/2	-3.3	O DELTA DATA SYSTEMS	1-1	1 1/2	0	0.0
N DATA GENERAL CORP	42-73	71 7/8	+4 3/8	+6.4	O COMPUTER HORIZONS	1-9	4 1/2	-3 3/4	-14.2	A DOCUMENTATION INC	6-34	24 5/8	-1 3/4	-5.2
N DATAPoint CORP	34-62	76 7/8	-7 7/8	-1.1	O COMPUTER NETWORK	5-16	7	+1 1/2	+7.6	O DATARAM CORP	6-32	18	+1 1/2	+2.8
N DIGITAL EQUIPMENT	39-59	56 5/8	+2 1/2	+4.6	N COMPUTER SCIENCES	8-17	11 5/8	+1 1/2	+4.4	N ELECTRONIC M & M	3-9	4 1/2	+3 3/8	+9.0
N ELECTRONIC ASSOC.	2-13	7	-1 1/8	-1.7	O COMPUTER TASK GROUP	1-7	7 1/2	+1 1/2	+7.1	O FABRI-TEK	1-2	3 1/4	+	+9.0
A ELECTRONIC ENGINEER.	9-19	11 1/4	+1 1/8	+1.1	O COMPUTER USAGE	2-4	2 1/4	0	0.0	O GENERAL COMPUTERS SYS	1-3	2 1/8	0	0.0
N FOUR-PHASE SYSTEMS	19-46	33 1/4	-1	-2.9	O COMPUT AUTO REP SVC	4-10	7 3/4	0	0.0	O GENERAL DATACOM IND	0-21	18	-1 1/4	-1.3
N FERRIS	28-40	37 1/2	+1 5/8	+4.5	O COSHARE	6-26	23 1/4	-3 1/4	-1.1	N HAZELTINE CORP	10-17	13 3/4	+3 3/4	+5.7
O GENERAL AUTOMATION	7-20	13 1/8	+1 1/4	+1.9	O CULLINANE CORP	14-33	20	-1 1/4	-1.2	N HARRIS CORP	17-36	28 1/2	+3 3/4	+2.7
O ORI COMPUTER CORP	1-3	1 1/4	-1 1/8	-9.0	O DATA DIMENSIONS INC	3-9	2 7/8	+1 1/8	+4.5	O INFORX INC	6-11	7 1/8	0	0.0
N HEMLETT-PACKARD CO	62-97	95 5/8	+1 1/8	+0.1	N ELECTRONIC DATA SYS.	1-5	2 3/8	-1 1/8	-4.1	O INFORMATION INTL INC	7-12	9 3/4	0	0.0
N HONEYWELL INC	43-76	69 7/8	+2	+2.9	O INSYTE CORP	1-3	1 1/4	0	0.0	O INFOTON	1-3	3 1/8	0	0.0
N IBM	75-321	75 3/8	-2 1/8	-2.7	O IPS COMPUTER MARKET.	3-9	3	0	0.0	O INTEL CORP	26-50	49 1/4	+1 3/4	+3.6
O MANAGEMENT ASSIST	9-29	17 1/8	-1 3/8	-7.4	O KEANE ASSOCIATES	3-6	5	-1 1/4	-4.7	O INTERSIL	7-18	15 3/4	+1 3/8	+9.5
O MANUFACTURING DATA S	9-25	23 3/4	+7 7/8	+3.8	O KEYDATA CORP	1-4	3 3/8	-1 1/4	-6.8	A LUNDY ELECTRONICS	4-8	7	+1 1/4	+3.7
O MICRODATA CORP	10-28	28	+4 1/4	+17.8										
O MINI-COMPUTER SYST	4-8	5	0	0.0	A LOGICON	10-19	13 1/2	-7 7/8	-6.0	O MSI DATA CORP	8-19	9 3/8	+3 3/8	+4.1
O MODULAR COMPUTER SYS	7-18	11 1/4	-3 3/4	-6.2	A NATIONAL CSS INC	15-48	47 3/4	0	0.0	N MEMOREX	27-59	27 1/4	-3 1/2	-11.3
N NCR	37-72	67 5/8	+1 1/4	+0.3	O NATIONAL DATA CORP	12-31	10 5/8	-1 1/2	-4.4	N ROMARK DATA SCI	6-15	10 3/4	-1 1/4	-2.2
N PRIME COMPUTER INC	9-22	17 3/8	-3 3/8	-2.1	O ON LINE SYSTEMS INC	7-30	21 5/8	+1	+4.8	O SMX	2-8	6 1/2	0	0.0
N PERKIN-ELMER	17-34	30 1/2	+3 1/4	+2.5	N PLANNING RESEARCH	4-10	5 5/8	-3 3/8	-6.2	O PARADYNE CORP	9-18	15 3/8	-1 1/2	-8.8
N SPERRY RAND	33-51	46 1/8	+1 1/4	+0.5	O PROGRAMMING & SYS	1-1	1 1/8	-1 1/8	-10.0	O PENRIL CORP	5-12	10 7/8	+1 1/4	+12.9
A SYSTEMS ENG. LABS	11-24	13 3/4	+1 1/8	+0.9	O RAPIDATA INC	3-7	6 3/8	-1 1/2	-7.2	N PERTEC CORP	8-17	8 1/2	0	0.0
O TANDEN COMPUTERS INC	13-37	31 1/4	+3 3/4	+2.4	O REYNOLDS & REYNOLD	18-36	29	+1 1/2	+1.7	O POTTER INSTRUMENT	2-2	1 3/4	0	0.0
A WANG LABS.	6-22	18 1/8	-3 3/8	-2.0	O SCIENTIFIC COMPUTERS	18-46	42 1/4	-5 1/2	-5.1	O RECOGNITION EQUIP	7-13	7	-3 3/8	-5.0
					N TYNHARE INC	10-41	37 1/8	-2	-5.0	O SCAN DATA	1-5	5 1/4	0	0.0
					A URS SYSTEMS	5-8	5 1/2	0	0.0	N STORAGE TECHNOLOGY	17-46	17 1/4	-2 3/4	-13.7
					N WYLY CORP	1-7	6	-3 3/8	-5.8	O T BAR INC	11-22	18 1/4	+1 1/4	+7.0
										O TALL CORP.	4-14	12 1/2	0	0.0
										A TEC INC	6-13	6 7/8	+1 1/8	+1.4
										N TEKTRONIX INC	33-57	51 1/4	+1 1/8	+0.2
										N TELER	3-9	4 7/8	-1 1/8	-2.5
										O TESSDATA SYSTEMS CP	9-25	24 3/4	+1 1/4	+5.3
										O WILTEK INC	1-2	3 1/4	0	0.0
LEASING COMPANIES														
O BOOTHIE COURIER CORP	13-21	17 1/2	-1 1/4	-1.4	PERIPHERALS & SUBSYSTEMS									
O COMDISCO INC	3-21	16 1/2	-1 1/4	-1.4	N ADDRESSOGRAPH-MULT	13-32	15 3/8	+2 1/8	+16.0	SUPPLIES & ACCESSORIES				
A COMMERCE GROUP CORP	1-1	1 1/2	0	0.0	N AMPER CORP	10-19	16 1/8	+7 7/8	+5.7	A AMERICAN BUS PRODS	6-11	9 1/8	+1 1/8	+1.3
O COMPUTER INVS TRS GRP	1-7	3 1/4	-1 1/8	-3.7	N ANDERSON JACOBSON	5-10	7	-1 1/8	-1.7	O BALTIMORE BUS FORMS	1-4	1	0	0.0
O CONTINENTAL INFO SYS	5-15	13 1/4	+1 1/4	+4.1	N APPLIED DIG DATA SYS	8-22	8 5/8	-3 3/4	-4.1	N BARRY WRIGHT	14-34	16 1/4	-1 1/2	-2.9
N DATRONIC RENTAL	1-4	3 3/4	+3 3/4	+25.0	O BEEHIVE INT'L	3-7	5 1/4	+1 1/4	+31.2	O CYBERMATICS INC	1-1	7 1/8	+1 1/8	+16.6
A DCL INC	3-5	5	+1 1/8	+2.4	A BOLT-BERANEK & NEW	8-14	13	+3 3/4	+6.1	O DUPLEX PRODUCTS INC	13-39	29 1/2	+1 1/2	+5.1
N DFF INC	8-14	11 1/4	+1 1/4	+2.2	N BUNKER-RAND	10-29	24 5/8	-3 1/2	-12.4	N ENNIS BUS. FORMS	8-23	22 1/8	+1 1/8	+0.5
N ITEL	11-36	12 3/4	+3 3/4	+6.2	A CALCOMP	3-13	11 7/8	0	0.0	N JN COMPANY	43-66	57 1/8	+1 1/2	+0.8
N LEASCO CORP	24-43	39 5/8	-5 1/8	-1.5	O CAMBRIDGE MEMORIES	3-9	3	+1 1/4	+9.0	O MOORE CORP LTD	26-34	33	-1 1/2	-0.7
O LEASACORP	1-4	5 1/8	0	0.0	N CENTRONICS DATA COMP	18-46	42 1/4	+5 1/8	+1.5	O T BAR INC	18-37	23 3/8	+1 1/2	+6.8
A PIONEER TEX CORP	3-7	3 3/8	+1 1/8	+3.8	O COMINTRONICS	1-4	2 1/8	0	0.0	O STANDARD REGISTER	20-27	24	+1 1/4	+0.9
N U.S. LEASING	13-20	16	+1 1/8	+7.5	O COMPUTER COMMUN.	6-10	8 3/4	-3 3/8	-4.1	A TAB PRODUCTS CO	8-16	14 3/4	-1	-6.3
					O COMPUER CONSOLES	4-16	15 1/4	+2 1/2	+19.6	A WABASH MAGNETICS	10-22	16 1/8	0	0.0
					O COMPUTER EQUIPMENT	3-6	8 3/4	0	0.0	N WALLACE BUS FORMS	18-33	25 3/4	+1 1/4	+5.1
					O COMPUTER TRANSCIVER	1-5	3	+1 1/8	+4.3					
					O COMPUTRIVISION CORP	9-61	57 1/8	-2 1/2	-4.1					
					O CONTECH	9-38	25 1/2	+1 1/4	+0.9					
					N CONRAC CORP	13-26	15	0	0.0					

EXCH: N=NEW YORK; A=AMERICAN; P=PHILADELPHIA; B=BALTIMORE; W=WASHINGTON
L=LOS ANGELES; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. ON LAST BID
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